Kawasaki

KLX110

Motorcycle Service Manual

Quick Reference Guide

This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.

Kawasaki

KLX110

Motorcycle Service Manual

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LIST OF ABBREVIATIONS

A	ampere(s)	lb	pound(s)
ABDC	after bottom dead center	m	meter(s)
AC	alternating current	min	minute(s)
ATDC	after top dead center	N	newton(s)
BBDC	before bottom dead center	Pa	pascal(s)
BDC	bottom dead center	PS	horsepower
BTDC	before top dead center	psi	pound(s) per square inch
°C	degree(s) Celsius	r	revolution
DC	direct current	rpm	revolution(s) per minute
F	farad(s)	TDC	top dead center
°F	degree(s) Fahrenheit	TIR	total indicator reading
ft	foot, feet	V	volt(s)
g	gram(s)	W	watt(s)
h	hour(s)	Ω	ohm(s)
L	liter(s)		

Read OWNER'S MANUAL before operating.

EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated crankcase emission (1) and exhaust emission (2) control systems in compliance with applicable regulations of the California Air Resources Board.

1. Crankcase Emission Control System
   This system eliminates the release of cranckcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the inlet side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the carburetor.
2. Exhaust Emission Control System
   This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this motorcycle. The fuel and ignition systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

TAMPERING WITH EMISSION CONTROL SYSTEM PROHIBITED

California State law prohibits the following acts or the causing thereof: (1) the removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new motorcycle for the purposes of emission control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the motorcycle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below:

Do not tamper with the original emission related parts:

- Carburetor and internal pars
- Spark plug
- Magneto ignition system
- Air cleaner element

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Federal law prohibits the following acts or the causing thereof: (1) The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below:

- Replacement of the original exhaust system or muffler with a component not in compliance with Federal regulations.
- Removal of the muffler(s) or any internal portion of the muffler(s).
- Removal of the air box or air box cover.
- Modifications to the muffler(s) or air inlet system by cutting, drilling, or other means if such modifications result in increased noise levels.

Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment are specified, do not use makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

For the duration of the warranty period, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your vehicle:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki Motorcycle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki motorcycles are introduced by the Special Tool Catalog or Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to Use This Manual

In this manual, the product is divided into its major systems and these systems make up the manual's chapters. The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

For example, if you want ignition coil information, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Ignition Coil section.

Whenever you see these WARNING and CAUTION symbols, heed their instructions! Always follow safe operating and maintenance practices.

⚠WARNING

This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury or loss of life.

CAUTION

This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of equipment.

This manual contains four more symbols (in addition to WARNING and CAUTION) which will help you distinguish different types of information.

NOTE

○ *This note symbol indicates points of particular interest for more efficient and convenient operation.*

- ● Indicates a procedural step or work to be done.
- ○ Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.
- ★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

General Information

Table of Contents

1-2 GENERAL INFORMATION

Before Servicing

Before starting to service a motorcycle, careful reading of the applicable section is recommended to eliminate unnecessary work. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed account has limitations, a certain amount of basic knowledge is also required for successful work.

Especially note the following:

(1) Dirt

Before removal and disassembly, clean the motorcycle. Any dirt entering the engine or other parts will work as an abrasive and shorten the life of the motorcycle. For the same reason, before installing a new part, clean off any dust or metal filings.

(2) Installation, Assembly

Generally, installation or assembly is the reverse of removal or disassembly. But if this Service Manual has installation or assembly procedures, follow them. Note parts locations and cable, wire, and hose routing during removal or disassembly so they can be installed or assembled in the same way. It is preferable to mark and record the locations and routing as much as possible.

(3) Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them evenly in a cross pattern. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter turn and then remove them. Where there is a tightening sequence indication in this Service Manual, the bolts, nuts, or screws must be tightened in the order and method indicated.

(4) Torque

When torque values are given in this Service Manual, use them. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

(5) Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for screws (particularly for the removal of screws held by a locking agent) in order to avoid damaging the screw heads.

(6) Edges

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.

(7) High-Flash-Point Solvent

A high-flash-point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is Stoddard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

(8) Gasket, O-Ring

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

(9) Liquid Gasket, Non-Permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly. Excessive amounts may block engine oil passages and cause serious damage. An example of a non-permanent locking agent commonly available in North America is Loctite Lock'n Seal (Blue).

(10) Press

A part installed using a press or driver, such as a wheel bearing, should first be coated with oil on its outer or inner circumference so that it will go into place smoothly.

(11) Ball Bearing and Needle Bearing

Do not remove a ball or a needle bearings unless it is absolutely necessary. Replace any ball or needle bearing that were removed with new ones, as removal generally damages bearings. Install bearings with the marked side facing out applying pressure evenly with a suitable driver. Only press on the race that forms the press fit with the base component to avoid damaging the bearings. This prevents severe stress on the balls or needles and races, and prevent races and balls or needles from being dented. Press a ball bearing until it stops at the stops in the hole or on the shaft.

(12) Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals.

When pressing in a seal which has manufacturer's marks, press it in with the marks facing out. Seals should be pressed into place using a suitable driver, which contacts evenly with the side of seal, until the face of the seal is even with the end of the hole. Before a shaft passes through a seal, apply a little high temperature grease on the lips to reduce rubber to metal friction.

(13) Circlip, Retaining Ring, and Cotter Pin

Replace any circlips and retaining rings, and cotter pins that were removed with new ones, as removal weakens and deforms them. When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more.

Before Servicing

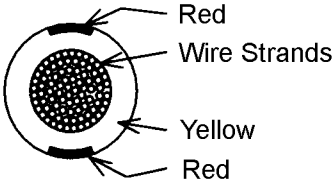
(14) Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the rubbing surfaces have an adequate lubricative film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface which has lost its lubricative film. Old grease and dirty oil should be cleaned off. Deteriorated grease has lost its lubricative quality and may contain abrasive foreign particles.

Don't use just any oil or grease. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended. This manual makes reference to molybdenum disulfide grease (MoS_2) in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

(15) Electrical Wires

All the electrical wires are either single-color or two-color and, with only a few exceptions, must be connected to wires of the same color. On any of the two-color wires there is a greater amount of one color and a lesser amount of a second color, so a two-color wire is identified by first the primary color and then the secondary color. For example, a yellow wire with thin red stripes is referred to as a "yellow/red" wire; it would be a "red/yellow" wire if the colors were reversed to make red the main color.

Wire (cross-section)	Name of Wire Color
	Yellow/Red

(16) Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed. These replacement parts will be damaged or lose their original function once removed.

(17) Inspection

When parts have been disassembled, visually inspect these parts for the following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

Abrasion	Crack	Hardening	Warp
Bent	Dent	Scratch	Wear
Color change	Deterioration	Seizure	

(18) Specifications

Specification terms are defined as follows:

"Standards" show dimensions or performances which brand-new parts or systems have.

"Service Limits" indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

Model Identification

KLX110–A1 Left Side View

KLX110–A1 Right Side View

General Specifications

Items		KLX110-A1
Dimensions:		
Overall length		1 555 mm
Overall width		660 mm
Overall height		955 mm
Wheelbase		1 065 mm
Road clearance		190 mm
Seat height		650 mm
Dry mass		64 kg
Curb mass:	Front	31 kg
	Rear	37 kg
Fuel tank capacity		3.8 L
Performance:		
Minimum turning radius		1.6 m
Engine:		
Type		4-stroke, SOHC, single cylinder
Cooling system		Air-cooled
Bore and stroke		53.0 × 50.6 mm
Displacement		111 mL
Compression ratio		9.5 : 1
Maximum horsepower		4.6 kW (6.3 PS) @7 000 r/min (rpm)
Maximum torque		6.9 N·m (0.70 kgf·m, 61 in·lb)
		@4 500 r/min (rpm)
Carburetion system		Carburetor, KEIHIN PB18
Starting system		Kick
Ignition system		Magneto CDI
Ignition timing		10° BTDC @1 300 r/min (rpm) /31°
		BTDC @4 000 r/min (rpm)
Spark plug		NGK CR6HSA
Valve timing:		
Inlet:	Open	0° BTDC
	Close	80° ABDC
	Duration	260°
Exhaust:	Open	35° BBDC
	Close	45° ATDC
	Duration	260°
Lubrication system		Forced lubrication (wet sump)
Engine oil:		
Type		API SE, SF or SG
		API SH or SJ with JASO MA
Viscosity		SAE10W-40
Capacity		1.1 L (when engine is completely dry)

General Specifications

Items		KLX110-A1
Drive Train:		
Primary reduction system:		
Type		Gear, centrifugal
Reduction ratio		3.048 (64/21)
Clutch type		Centrifugal & wet, multi disc
Transmission:		
Type		3-speed, constant mesh, return shift
Gear ratios:	1st	3.273 (36/11)
	2nd	1.938 (31/16)
	3rd	1.350 (27/20)
Final drive system:		
Type		Chain drive
Reduction ratio		2.642 (37/14)
Overall drive ratio		10.873 @Top gear
Frame:		
Type		Backbone
Caster (rake angle)		25.5°
Trail		54 mm
Front tire:	Type	C803
	Size	2.50 - 14 4PR
Rear tire:	Type	C803
	Size	3.00 - 12 4PR
Front suspension:	Type	Telescopic fork
	Wheel travel	110 mm
Rear suspension:	Type	Swingarm
	Wheel travel	107 mm
Brake type:	Front	Drum
	Rear	Drum

Specifications are subject to change without notice, and may not apply to every country.

Torque and Locking Agent

The following tables lists the tightening torque for the major fasteners requiring use of a non-permanent locking agent or liquid gasket.

Letters used in the "Remarks" column mean:

L : Apply a non-permanent locking agent to the threads.

S : Tighten the fasteners following the specified sequence.

The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

Basic Torque for General Fasteners

Threads dia. (mm)	Torque		
	N·m	kgf·m	ft·lb
5	3.4 ∼ 4.9	0.35 ∼ 0.50	30 ∼ 43 in·lb
6	5.9 ∼ 7.8	0.60 ∼ 0.80	52 ∼ 69 in·lb
8	14 ∼ 19	1.4 ∼ 1.9	10.0 ∼ 13.5
10	25 ∼ 34	2.6 ∼ 3.5	19.0 ∼ 25
12	44 ∼ 61	4.5 ∼ 6.2	33 ∼ 45
14	73 ∼ 98	7.4 ∼ 10.0	54 ∼ 72
16	115 ∼ 155	11.5 ∼ 16.0	83 ∼ 115
18	165 ∼ 225	17.0 ∼ 23.0	125 ∼ 165
20	225 ∼ 325	23 ∼ 33	165 ∼ 240

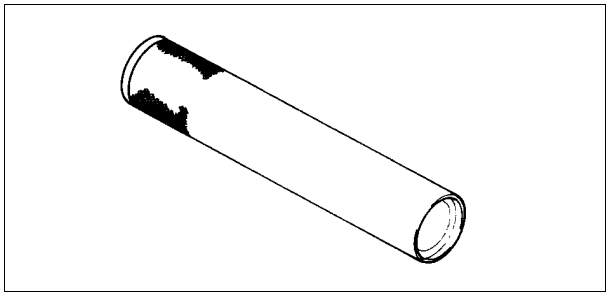
Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Engine Top End:				
Rocker arm shaft stopper mounting screws	5.2	0.53	46 in·lb	
Valve adjusting screw locknuts	8.8	0.9	78 in·lb	
Camshaft sprocket bolt	12	1.2	8.9	L
Cylinder head nuts	22	2.2	16	S
Cylinder head bolts	12	1.2	8.9	L,S
Spark plug	13	1.3	9.6	
Chain tensioner mounting bolts	5.2	0.53	46 in·lb	
Tensioner cap bolt	5.2	0.53	46 in·lb	
Camshaft sprocket cover bolts	5.2	0.53	46 in·lb	
Camshaft chain guide bolt	5.2	0.53	46 in·lb	
Camshaft chain holder bolts	5.2	0.53	46 in·lb	
Valve adjusting cap bolts	5.2	0.53	46 in·lb	
Clutch:				
Clutch cover screws	5.2	0.53	46 in·lb	S
Clutch cover damper screws	2.9	0.3	26 in·lb	
Crankshaft hold bearing screw	2.9	0.3	26 in·lb	
Clutch hub nut (primary)	72	7.3	53	
Clutch hub nut (secondary)	72	7.3	53	
Clutch spring bolts	3.4	0.35	30 in·lb	
Clutch adjusting screw locknut	19	1.9	14	
Shift drum position plate screw	5.2	0.53	46 in·lb	
Shift drum positioning lever pivot bolt	5.2	0.53	46 in·lb	L
Kick guide screw	5.2	0.53	46 in·lb	
Return spring pin	22	2.2	16	
Engine Lubrication System:				
Oil pipe banjo bolts	15	1.5	11	
Oil pipe clamp screw	5.2	0.53	46 in·lb	
Oil pump mounting screw	5.2	0.53	46 in·lb	
Oil filter cap bolts	5.2	0.53	46 in·lb	
Engine oil drain plug	29	3.0	21	

Torque and Locking Agent

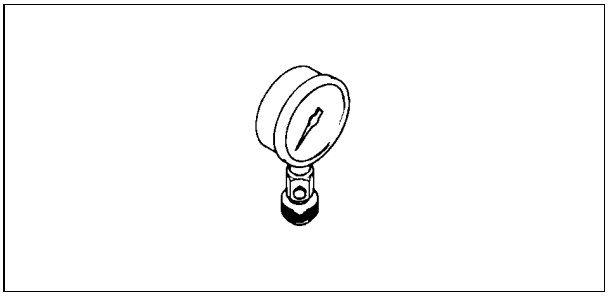
Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Engine Removal/Installation:				
Engine mounting nuts	54	5.5	40	
Side stand mounting nut	23	2.3	17	
Crankshaft/Transmission:				
Crankcase screws	5.2	0.53	46 in·lb	S
Bearing retainer screw 5 mm	2.9	0.3	26 in·lb	
Bearing retainer screw 6 mm	5.2	0.53	46 in·lb	
Shift return spring pin	22	2.2	16	L
Shift drum Allen bolt	5.2	0.53	46 in·lb	L
Cam chain guide stopper screw	5.2	0.53	46 in·lb	
Wheels/Tires:				
Spoke nipples	1.2	0.12	10 in·lb	
Front axle nut	44	4.5	32	
Rear axle nut	64	6.5	47	
Torque link nut	25	2.5	18	
Final Drive:				
Rear sprocket nuts	34	3.5	25	
Brakes:				
Brake pedal bolt	8.8	0.9	79 in·lb	
Suspension:				
Front fork clamp bolts:				
Upper	20	2.0	15	
Lower	29	3.0	22	
Front fork bottom Allen bolts	20	2.0	15	
Torque link nuts:				
Front	25	2.5	18	
Rear	25	2.5	18	
Swingarm pivot shaft nut	78	8.0	58	
Rear shock absorber mounting nuts:				
Upper	39	4.0	29	
Lower	39	4.0	29	
Steering:				
Steering stem head nut	44	4.5	32	
Handlebar clamp bolt	25	2.5	18	
Steering stem nut	4.9	0.5	43 in·lb	
Electrical System:				
Gear position switch screw	2.9	0.3	26 in·lb	
Spark plug	13	1.3	9.6	
Magneto flywheel nut	41.5	4.25	30.6	
Exciter coil mounting screws	5.2	0.53	46 in·lb	
Pickup coil mounting screw	2.9	0.30	26 in·lb	
Magneto cover mounting screw	5.2	0.53	46 in·lb	S
Exciter coil plate screw	2.9	0.3	26 in·lb	
Pickup coil plate screw	2.9	0.3	26 in·lb	
Magneto cover damper	2.9	0.3	26 in·lb	

Special Tools

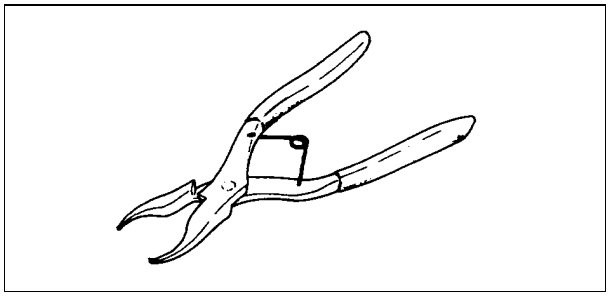
Steering Stem Bearing Driver: 57001–137



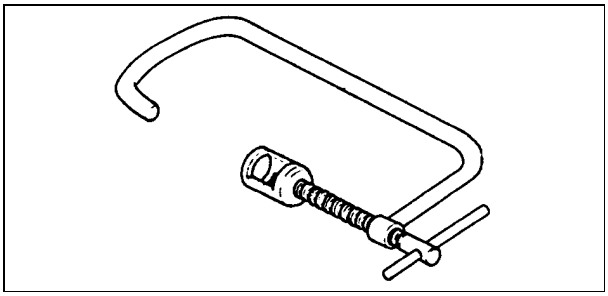
Compression Gauge : 57001–221



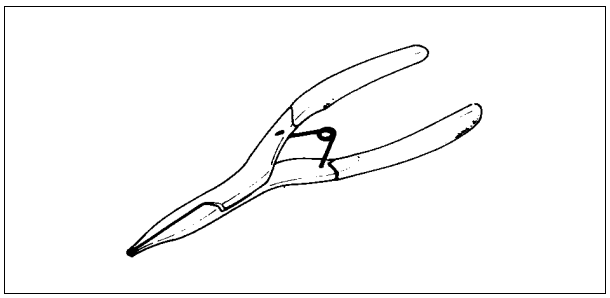
Inside Circlip Pliers: 57001–143



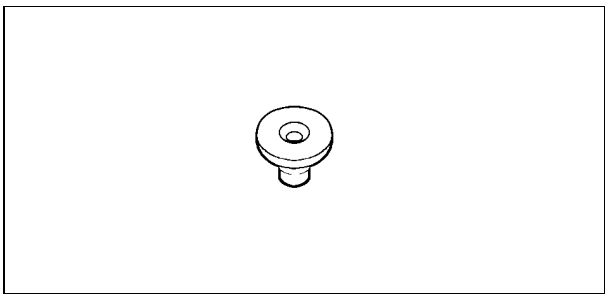
Valve Spring Compressor Assembly : 57001–241



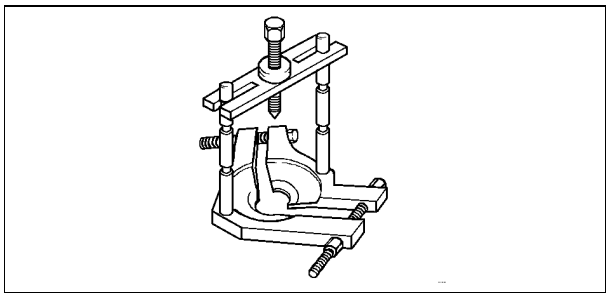
Outside Circlip Pliers: 57001-144



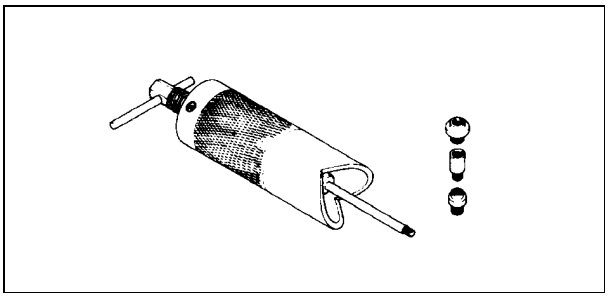
Bearing Puller Adapter: 57001–317



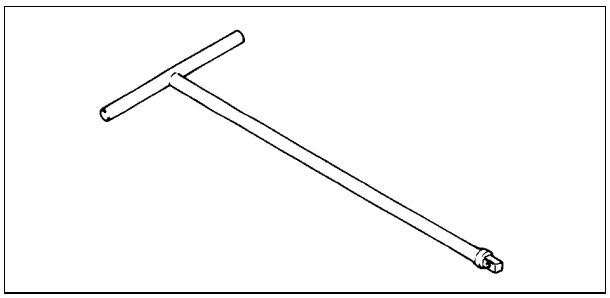
Bearing Puller : 57001–158



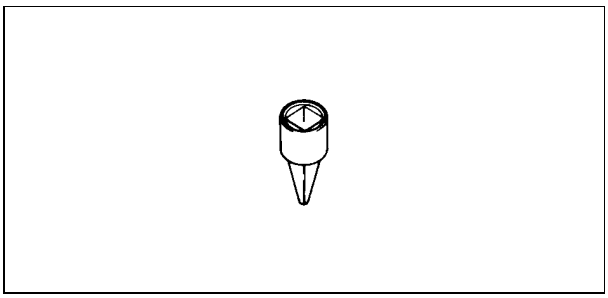
Piston Pin Puller Assembly: 57001–910



Fork Cylinder Holder Handle : 57001–183

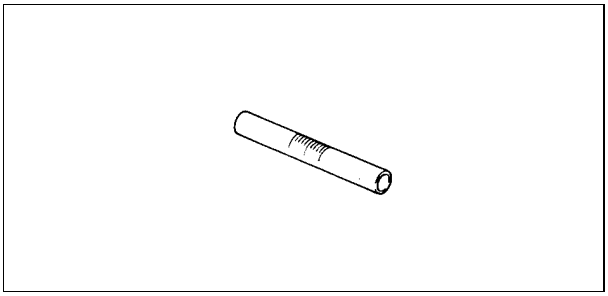


Fork Cylinder Holder Adapter: 57001–1011

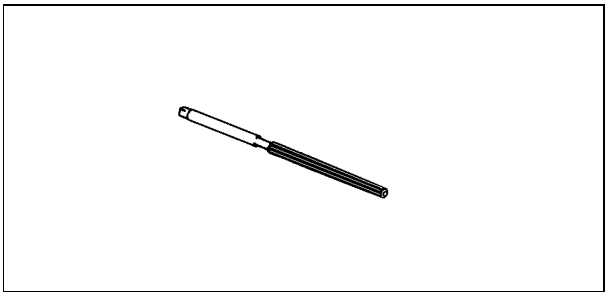


Special Tools

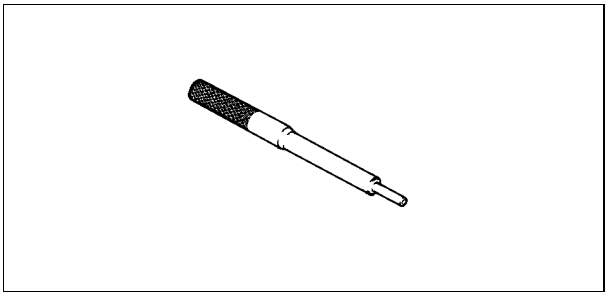
Fuel Level Gauge: 57001–1017



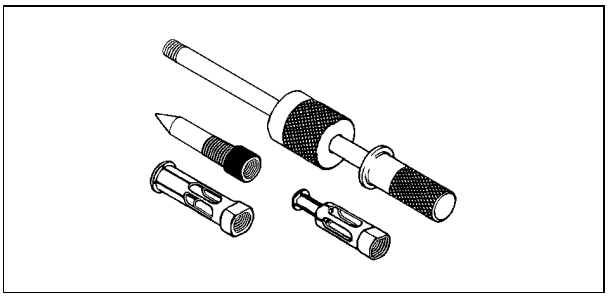
Valve Guide Reamer, ϕ4.5: 57001–1020



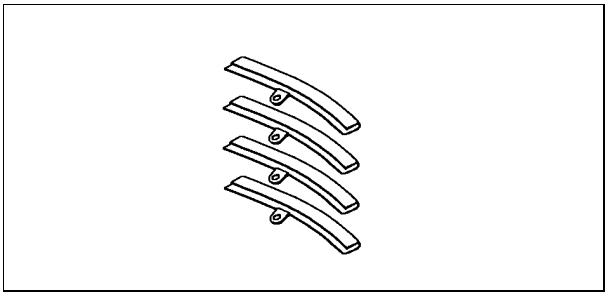
Valve Guide Arbor, ϕ4.5: 57001–1021



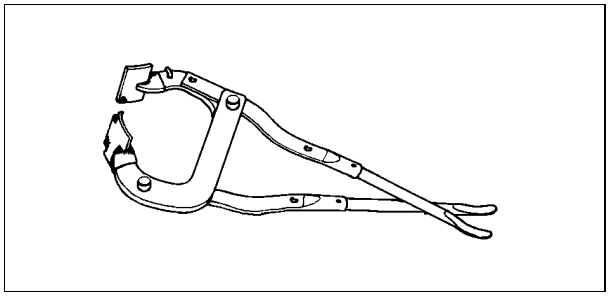
Oil Seal & Bearing Remover: 57001–1058



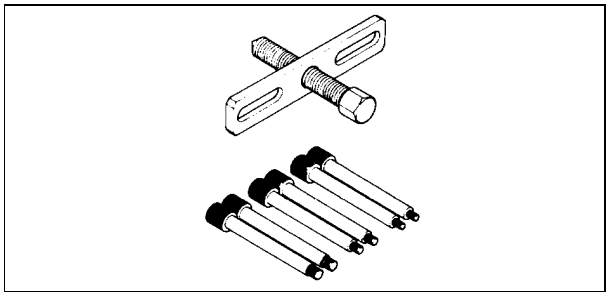
Rim Protector: 57001–1063



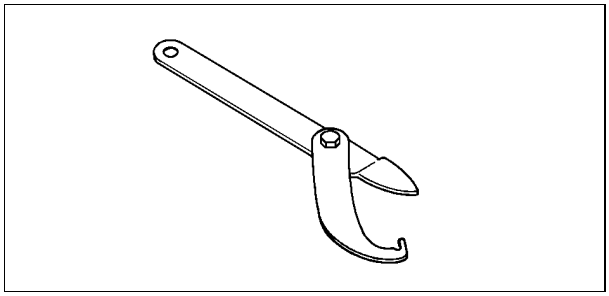
Bead breaker Assembly: 57001–1072



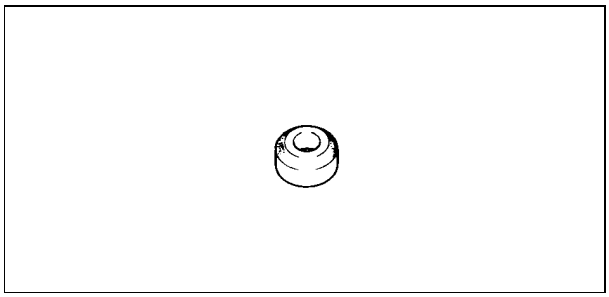
Crankcase Splitting Tool Assembly: 57001–1098



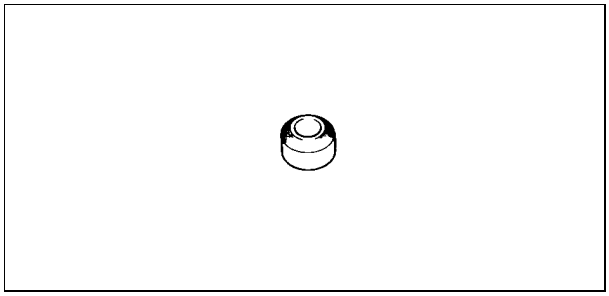
Steering Stem Nut Wrench: 57001–1100



Valve Seat Cutter, 45° – ϕ27.5: 57001–1114

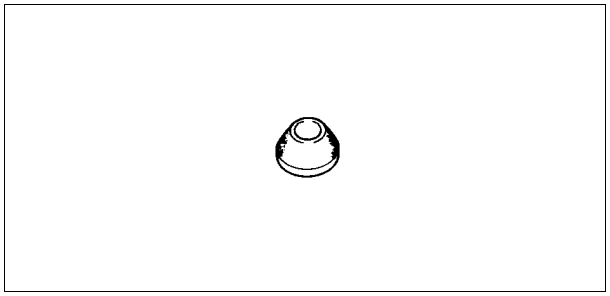


Valve Seat Cutter, 32° – ϕ25: 57001–1118

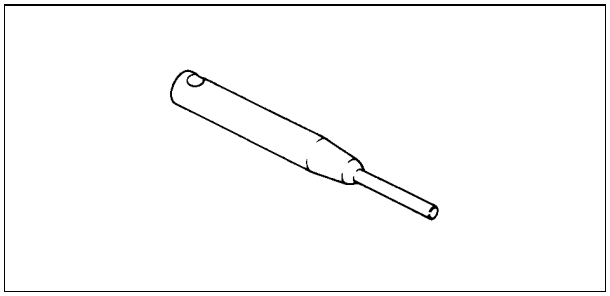


Special Tools

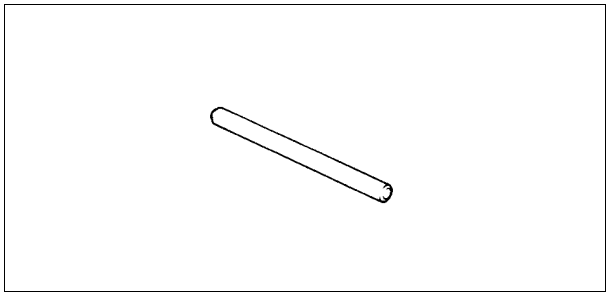
Valve Seat Cutter, 60° – φ30 : 57001–1123



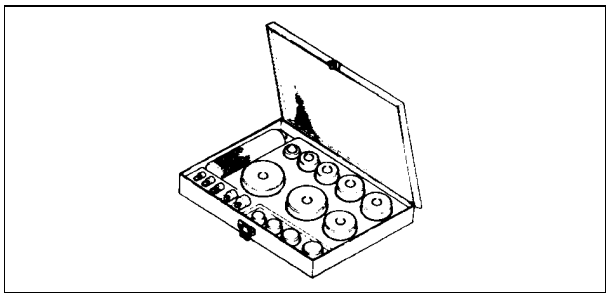
Valve Seat Cutter Holder, φ5.5 : 57001–1125



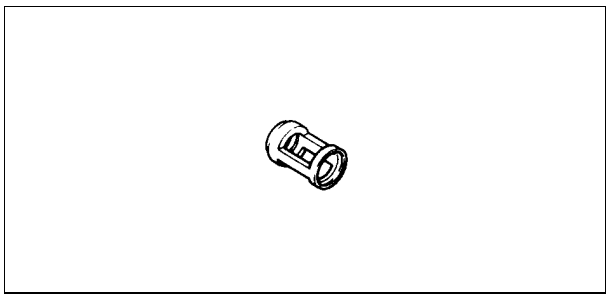
Valve Seat Cutter Holder Bar : 57001–1128



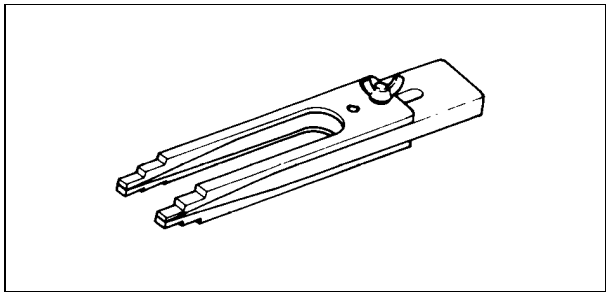
Bearing Driver Set : 57001–1129



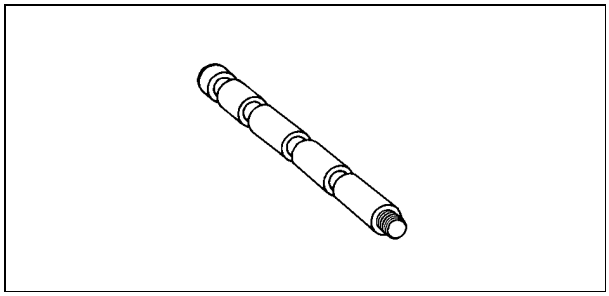
Valve Spring Compressor Adapter, φ20 : 57001–1154



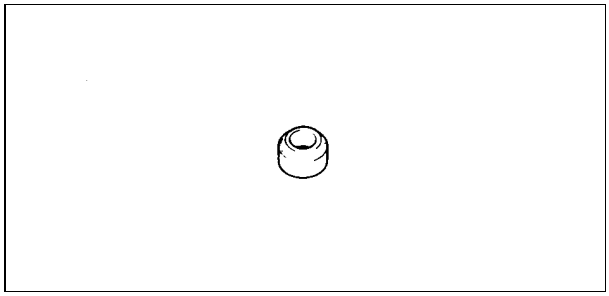
Crankshaft Jig: 57001–1174



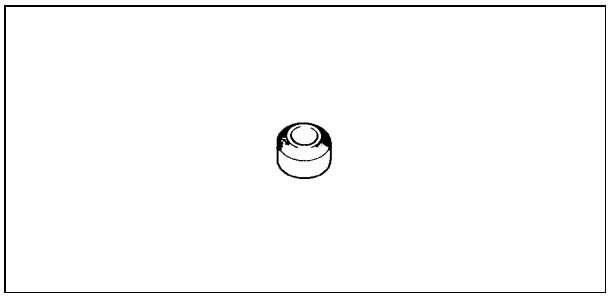
Bearing Puller Stud: 57001–1190



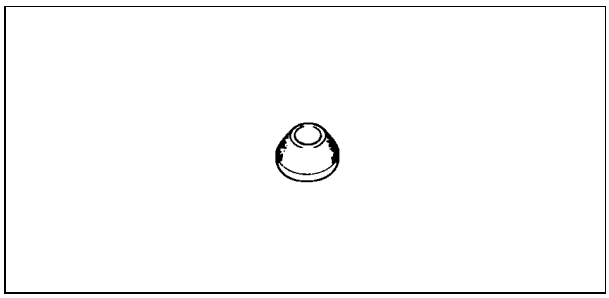
Valve Seat Cutter, 45° – φ22: 57001–1205



Valve Seat Cutter, 32° – φ22: 57001–1206

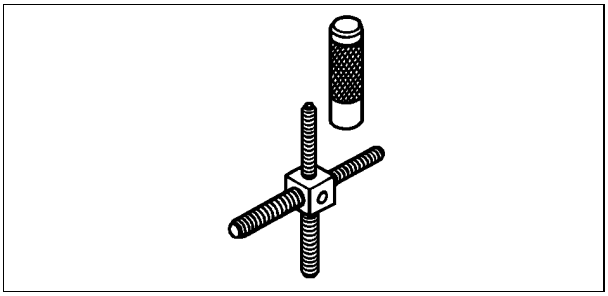


Valve Seat Cutter, 67.5° – φ22: 57001–1207

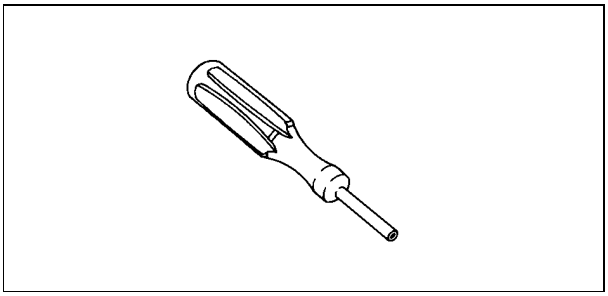


Special Tools

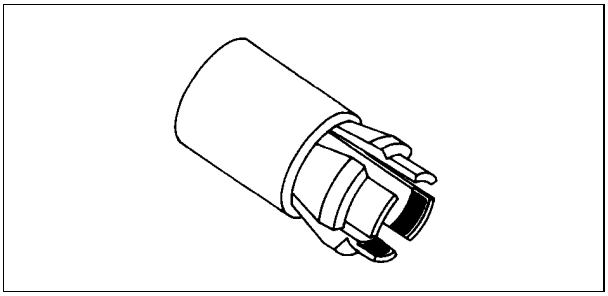
Rotor Puller, M16/M18/M20/N22 x 1.5 : 57001–1216



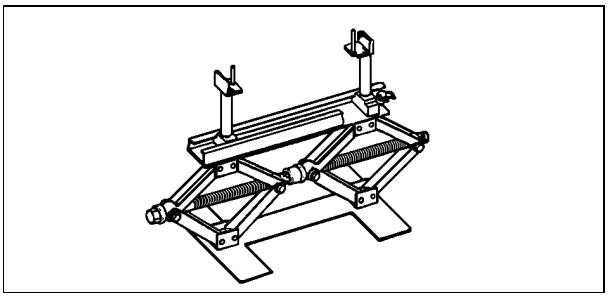
Valve Adjusting Screw Holder: 57001–1217



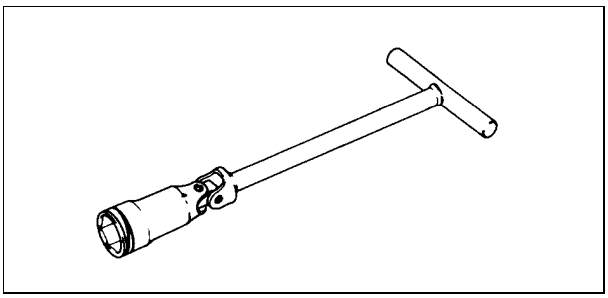
Fork Oil Seal Driver: 57001–1219



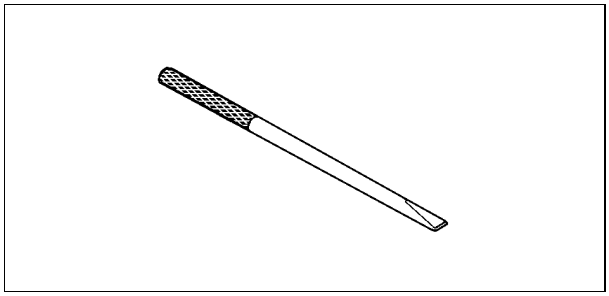
Jack: 57001–1238



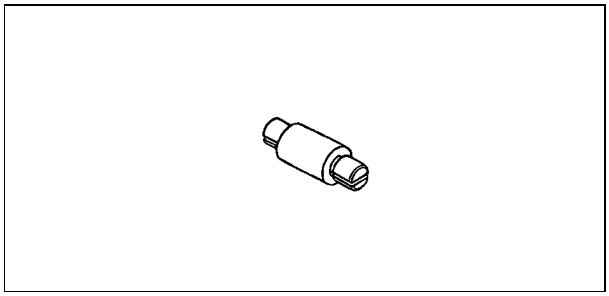
Spark Plug Wrench, Hex 16: 57001–1262



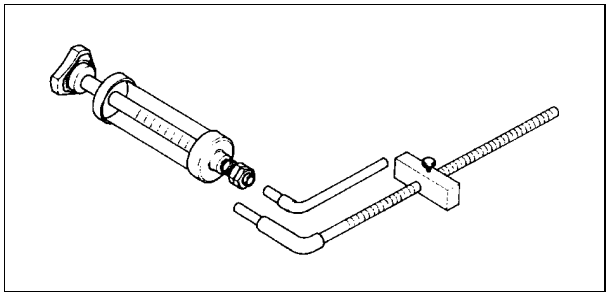
Bearing Remover Shaft ϕ9: 57001–1265



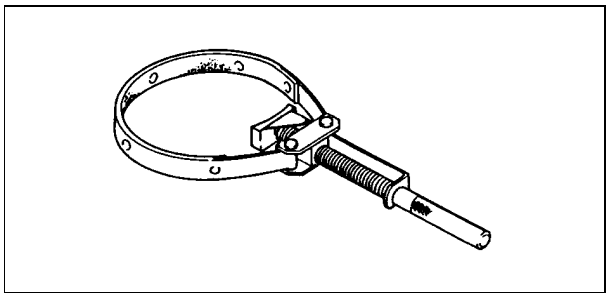
Bearing Removal Head ϕ10 $\times$ ϕ12: 57001–1266



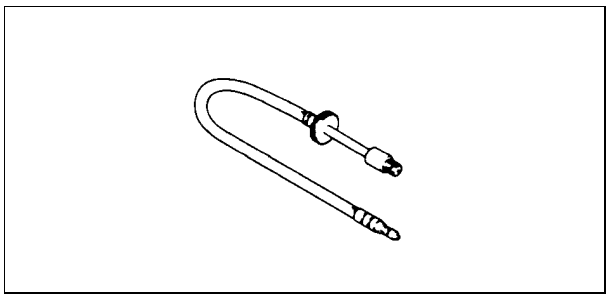
Fork Oil Level Gauge: 57001–1290



Flywheel Holder: 57001–1313

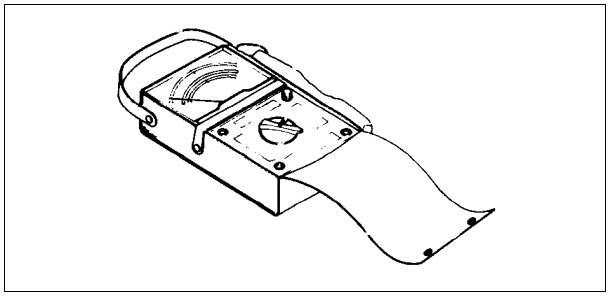


Compression Gauge Adapter, M10 x 1.0 : 57001–1317

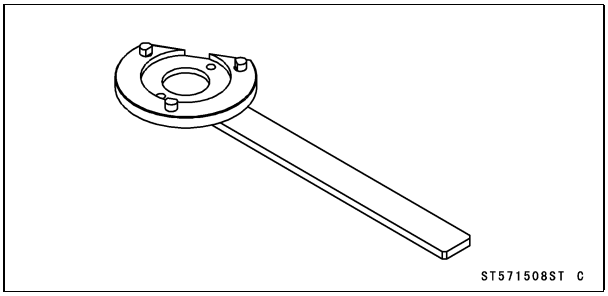


Special Tools

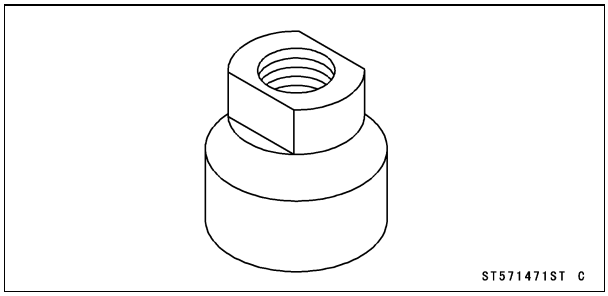
Hand Tester: 57001–1394



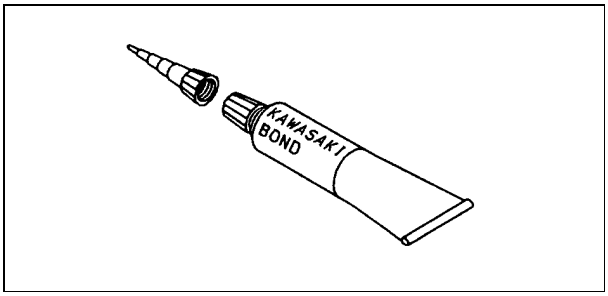
Clutch Holder: 57001–1508



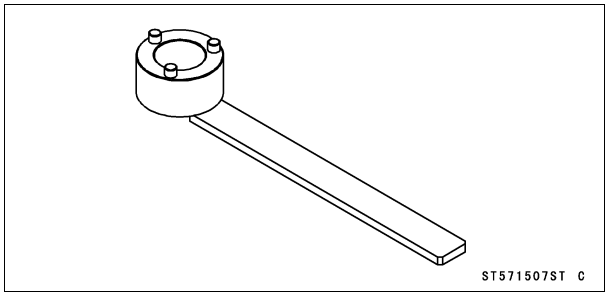
Flywheel Puller, M28 × 1.0: 57001–1471



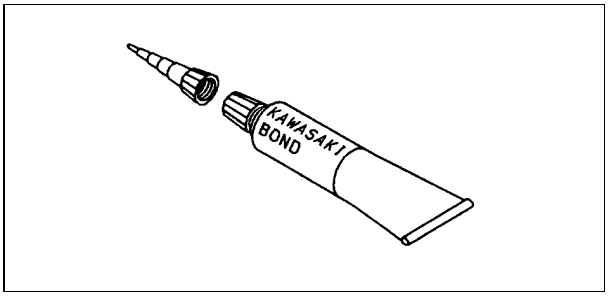
Kawasaki Bond (Liquid Gasket- Black): 92104–1003



Primary Clutch Holder: 57001–1507

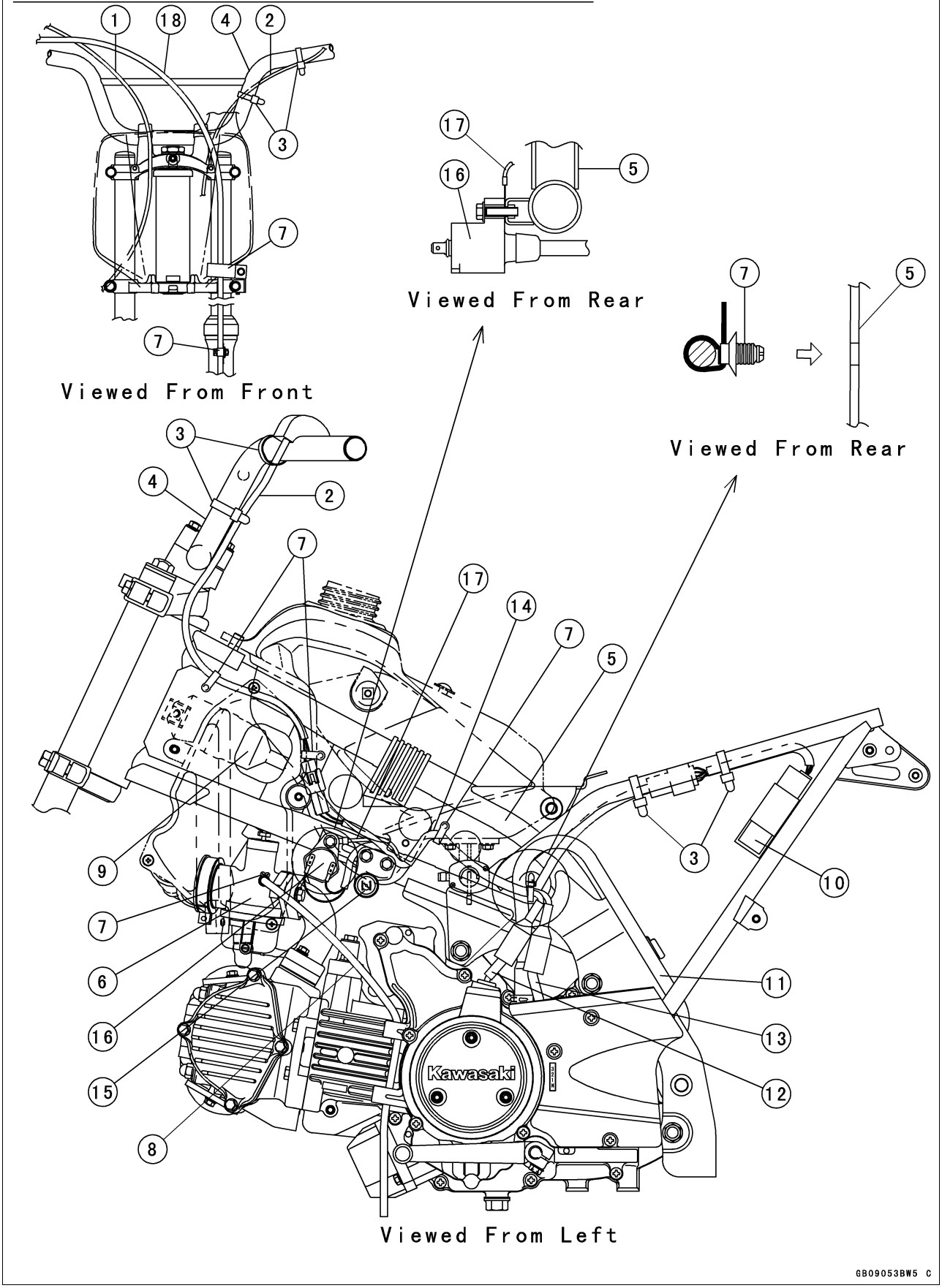


Kawasaki Bond (Silicone sealant): 56019–120



Cable, Wire and Hose Routing

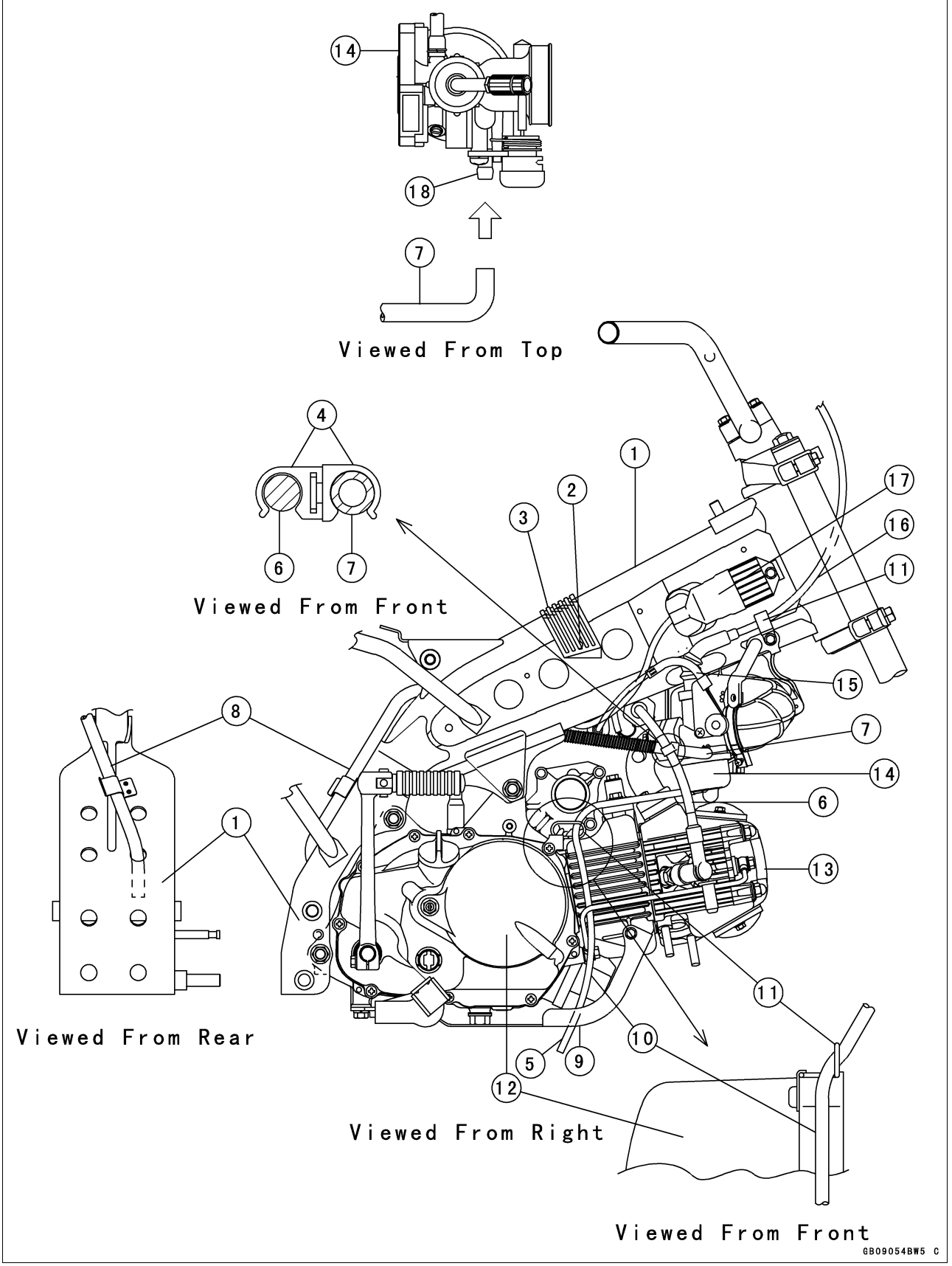
THROTTLE CABLE AND SWITCH LEAD ROUTING



Cable, Wire and Hose Routing

1. Throttle Cable
2. Engine Stop Switch Lead
3. Band
4. Handlebar
5. Frame
6. Carburetor
7. Clamp
8. Air Vent Hose
9. Regulator/Rectifier
10. Igniter
11. Crankcase Breather Hose
12. Magneto Leads
13. Gear Position Switch Leads
14. Main Harness
15. Choke Knob
16. Ignition Coil
17. Ground Lead
18. Brake Cable

MAIN HARNESS, HOSE AND CABLE ROUTING



Cable, Wire and Hose Routing

1. Frame
2. Align the damper center with the frame hole.
3. Apply adhesive to diagonal line portion.
4. Clamp
5. Run the carburetor drain hose into a hole of the engine guard.
6. Ignition Coil Lead
7. Inlet Fuel Hose
8. Crankcase Breather Hose
9. Engine Guard
10. Carburetor Drain Hose
11. Clamp
12. Clutch Cover
13. Cylinder Head
14. Carburetor
15. Choke Cable
16. Throttle Cable
17. Regulator/Rectifier
18. Inlet Fitting

Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	× 1 000 000
kilo	k	× 1 000
centi	c	× 0.01
milli	m	× 0.001
micro	μ	× 0.000001

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

L	×	0.2642	=	gal (US)
L	×	0.2200	=	gal (imp)
L	×	1.057	=	qt (US)
L	×	0.8799	=	qt (imp)
L	×	2.113	=	pint (US)
L	×	1.816	=	pint (imp)
mL	×	0.03381	=	oz (US)
mL	×	0.02816	=	oz (imp)
mL	×	0.06102	=	cu in

Units of Force:

N	×	0.1020	=	kg
N	×	0.2248	=	lb
kg	×	9.807	=	N
kg	×	2.205	=	lb

Units of Length:

km	×	0.6214	=	mile
m	×	3.281	=	ft
mm	×	0.03937	=	in

Units of Torque:

N·m	×	0.1020	=	kg·m
N·m	×	0.7376	=	ft·lb
N·m	×	8.851	=	in·lb
kg·m	×	9.807	=	N·m
kg·m	×	7.233	=	ft·lb
kg·m	×	86.80	=	in·lb

Units of Pressure:

kPa	×	0.01020	=	kg/cm^2
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cm Hg
kg/cm^2	×	98.07	=	kPa
kg/cm^2	×	14.22	=	psi
cm Hg	×	1.333	=	kPa

Units of Speed:

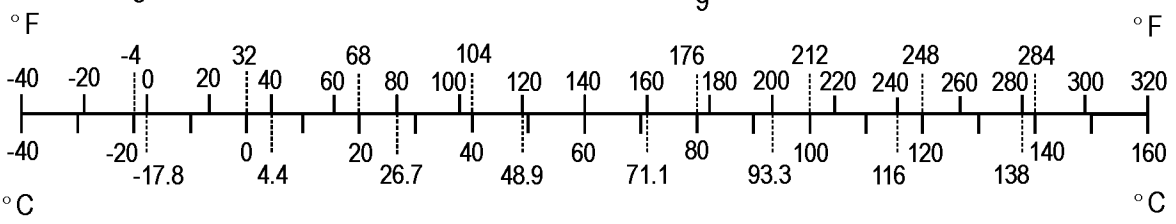
km/h	×	0.6214	=	mph

Units of Power:

kW	×	1.360	=	PS
kW	×	1.341	=	HP
PS	×	0.7355	=	kW
PS	×	0.9863	=	HP

Units of Temperature:

$$\frac{9(°C+40)}{5} - 40 = °F \qquad \frac{5(°F+40)}{9} - 40 = °C$$



Periodic Maintenance

Table of Contents

2-2 PERIODIC MAINTENANCE

Periodic Maintenance Chart

The maintenance must be done in accordance with this chart to keep the motorcycle in good running condition.

	FREQUENCY / OPERATION	Initial	Every		See Page
		5 hours (1 month)	50 hours (6 months)	100 hours (12 months)	
E	Engine oil-change	●	●	●	P8
E	(e) Spark plug-clean, gap †		●	●	P20
E	Clutch-inspection †	●	●	●	P8
E	(e) Valve clearance-inspection †			●	P7
E	Oil filter element-replace	●		●	P9
E	(e) Air cleaner element-clean †	●	●	●	P6
E	(e) Idle speed-inspection †	Every ride			P5
E	(e) Throttle grip play-inspection †	●	●	●	P4
E	Fuel tap-clean		●	●	P4
E	Spark arrester-clean			●	P7
E	Engine sprocket-inspection †		●	●	P13
C	Fuel hose, connections-inspection†		●	●	P4
C	Brake adjustment-inspection †	Every ride			P13
C	Brake lining wear-inspection †	Every ride			P14
C	Brake camshaft-grease		●	●	P16
C	Brake cable-inspection †	Every year			P22
C	Spoke tightness and rim runout-inspection †	●	●	●	P10
C	Drive chain slack-inspection†	Every ride			P11
C	Drive chain-lubricate	Every ride			P13
C	Drive chain wear-inspection †	●	●	●	P12
C	Front fork-inspect/clean †		●	●	P17
C	Chain slipper-inspection †		●	●	P13
C	Front fork oil-inspection †	Every year			P16
C	Nuts, bolts, fasteners-inspection†	●	●	●	P23
C	Steering play-inspection †	●	●	●	P18
C	Steering stem bearing-grease			●	P20
C	Rear sprocket-inspection †		●	●	P13
C	General lubrication-perform	●	●	●	P21
C	Side stand-inspection †	●		●	P20
C	Wheel bearing-inspection †		●	●	P10
C	Swingarm pivots-inspection †	●	●	●	P18
C	Rear shock absorber-inspection †		●	●	P17

†: Replace, add, adjust or torque if necessary.
(e): Emission Related
E: ENGINE
C: CHASSIS

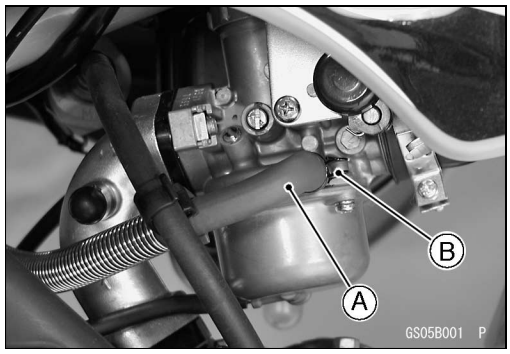
Specifications

Item	Standard	Service Limit
Fuel System:		
Throttle grip free play	2 ~ 3 mm	– – –
Idle speed	1250 ∼ 1350 r/min (rpm)	– – –
Air cleaner element oil	High quality foam air filter oil	– – –
Engine Top End:		
Valve clearance:		
Exhaust	0.04 ∼ 0.08 mm	– – –
Inlet	0.04 ∼ 0.08 mm	– – –
Clutch:		
Clutch adjusting screw	1/4 turn out	– – –
Engine Lubrication System:		
Engine oil:		
Type	API SE, SF or SG	
	API SH or SJ with JASO MA	
Viscosity	SAE 10W-40	
Capacity	1.1 L (when engine is completely dry)	– – –
	1.0 L (when filter is removed)	– – –
	0.9 L (when filter is not removed)	– – –
Level	Between upper and lower level lines	– – –
Tires:		
Rim runout:		
Axial	0.5 mm or less	2 mm
Radial	0.8 mm or less	2 mm
Final Drive:		
Drive chain slack	0 ∼ 5 mm	– – –
Drive chain 20-link length	254.0 ∼ 254.6 mm	259 mm
Brakes:		
Brake lever free play	4 ∼ 5 mm	– – –
Brake pedal free play	20 ∼ 30 mm	– – –
Brake cam lever angle: Front	$80^\circ \sim 90^\circ$	– – –
Rear	$80^\circ \sim 90^\circ$	– – –
Suspension:		
Fork oil viscosity	SHOWA SS-8 (SAE 10W-20)	– – –
Fork oil level (fully compressed, without spring)	89 ± 2 mm	– – –
Electrical System:		
Standard plug	NGK CR6HSA	– – –
Spark plug gap	06. ∼ 0.7 mm	– – –

Special Tools - Valve Adjusting Screw Holder: 57001–1217
Jack: 57001–1238
Fork Oil Level Gauge: 57001–1290
Steering Stem Nut Wrench: 57001–1100

Fuel System

Fuel Hose and Connection Inspection



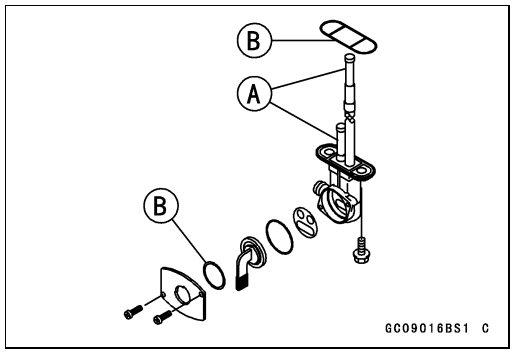
- Check the fuel hose [A] for the following.
  Fuel leakage
  Loose or improperly positioned line clamp [B]
  Deteriorated or damaged line

★Replace the fuel hose if any fraying, cracks or bulges are noticed.

- When installing, route the hoses according to Cable, Wire, and Hose Routing section in the General Information chapter.
- When installing the fuel hoses, avoid sharp bending, kinking, flattening or twisting, and route the fuel hoses with a minimum of bending so that the fuel flow will not be obstructed.

★Replace the hose if it has been sharply bent or kinked.

Fuel Tap Inspection



- Remove the fuel tap (see Fuel System chapter).
- Check the fuel tap filter screen [A] for any breaks or deterioration.

★If the fuel tap screen have any breaks or is deteriorated, it may allow dirt to reach the carburetor, causing poor running. Replace the fuel tap.

★If the fuel tap leaks, or allows fuel to flow when it is at OFF position, replace the damaged O-ring [B].

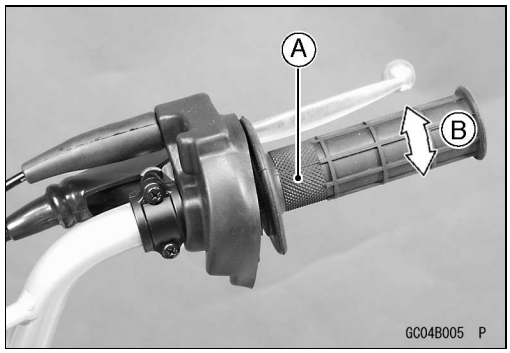
Fuel Tap Cleaning

⚠WARNING

Clean the tap in a well-ventilated area, and take care that there is no sparks or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvent to clean the tap.

- Clean the fuel tap filter screen in a high flash-point solvent.
- Pour high flash-point solvent through the tap in all lever positions.
- Dry the tank and tap with compressed air.
- Install the tap in the tank.
- Install the fuel tank.

Throttle Grip Free Play Inspection



If the throttle grip has excessive free play due to cable stretch or misadjustment, there will be a delay in throttle response. Also, the throttle valve may not open fully at full throttle. On the other hand, if the throttle grip has no play, the throttle will be hard to control, and the idle speed will be erratic. Check the throttle grip play periodically in accordance with the Periodic Maintenance Chart, and adjust the play if necessary.

The throttle cable routing is shown in Cable, Harness, Hose Routing section in the General Information chapter.

- Check throttle grip free play [B] by lightly turning the throttle grip [A] back and forth.

★If the free play is improper, adjust the throttle cable.

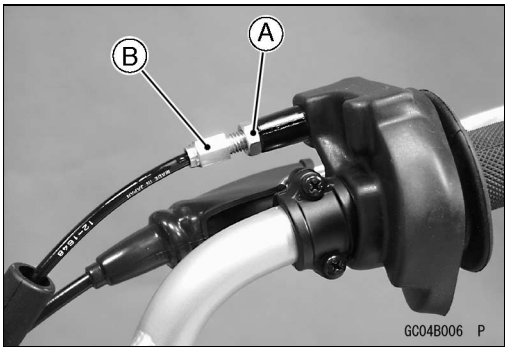
Throttle Grip Free Play

Standard:	**2 ∼ 3 mm**

Periodic Maintenance Procedures

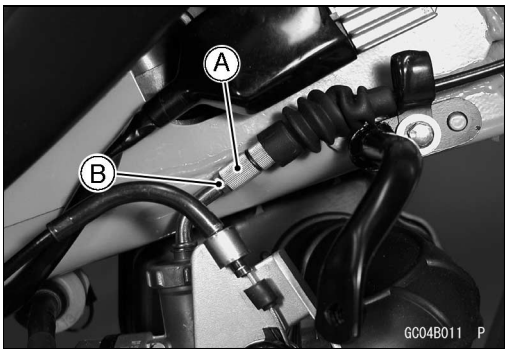
Throttle Grip Free Play Adjustment

- Loosen the locknut [A] at the upper end of the throttle cable.
- Turn the adjuster [B] until the proper amount of throttle grip free play is obtained.
- Tighten the locknut.



★If the throttle grip free play cannot be adjusted with the adjuster at the upper end of the throttle cable, use the cable adjuster [A] at the carburetor.

- Pull the boot off of the carburetor top. Make the necessary free play adjustment at the lower cable adjuster, tighten the locknut [B], and install the boot.
- Check if the throttle grip moves smoothly from full open to close, and the throttle closes quickly and completely in all steering positions by the return spring. If not, check the throttle cable routing, grip free play, and cable damage. Then lubricate the throttle cable.
- With the engine idling, turn the handlebar both ways and check if handlebar movement changes the idling speed. If so, the throttle cable may be improperly adjusted or incorrectly routed, or damaged. Be sure to correct any of these conditions before riding.



⚠WARNING

Operation with an improperly adjusted, incorrectly routed, or damaged cable could result in an unsafe riding condition.

Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- Turn the handlebar from side to side while idling the engine.

★If handlebar movement changes the idle speed, the throttle cable may be improperly adjusted or incorrectly routed, or it may be damaged. Be sure to correct any of these conditions before riding.

⚠WARNING

Operation with an improperly adjusted, incorrectly routed, or damaged cable could result in an unsafe riding condition.

- Check idle speed using a tachometer.

★If the idle speed is out of the specified range, adjust it.

Idle Speed

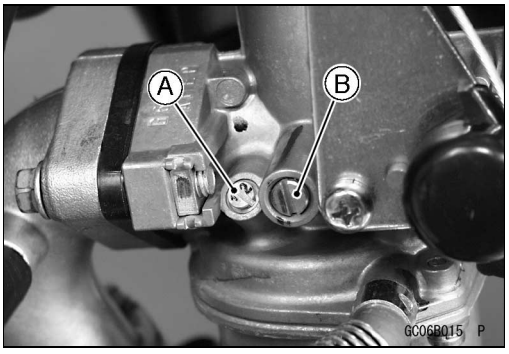
Standard: 1250 ∼ 1350 r/min (rpm)

Idle Speed Adjustment

○ First turn in the air screw [A] until it seats lightly, and back it out 1 1/4 turns.

- Start the engine and warm it up thoroughly.
- Turn the idle adjusting screw [B] until idle speed is correct.

○ Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.



Periodic Maintenance Procedures

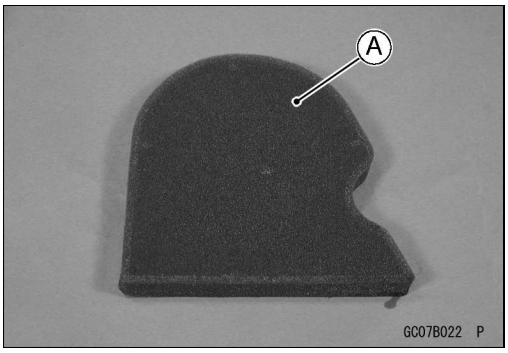
Air Cleaner Element Cleaning and Inspection

NOTE

- *In dusty areas, the element should be cleaned more frequently than recommended interval.*
- *After riding through rain or on muddy roads, the element should be cleaned immediately.*
- *Since repeated cleaning opens the pores of the element, replace it with a new one. Also, if there is a break in the element material or any other damage to the element, replace the element with a new one.*

⚠ WARNING

Clean the element in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or a low flash-point solvent to clean the element.



- Remove the air cleaner element [A] (see Fuel System chapter).

- Clean the element in a bath of a high flash-point solvent using a soft bristle brush. Squeeze it dry in a clean towel. Do not wring the element or blow it dry; the element can be damaged.
- Check all the parts of the element for visible damage.

★ If any of the parts of the element are damaged, replace them.

- After cleaning, saturate the element with a high-quality foam-air-filter oil, squeeze out the excess, then wrap it in a clean rag and squeeze it as dry as possible. Be careful not to tear the sponge filter.
- Remove the towel from the carburetor.
- Install the element.

Engine Top End

Valve Clearance Inspection

CAUTION

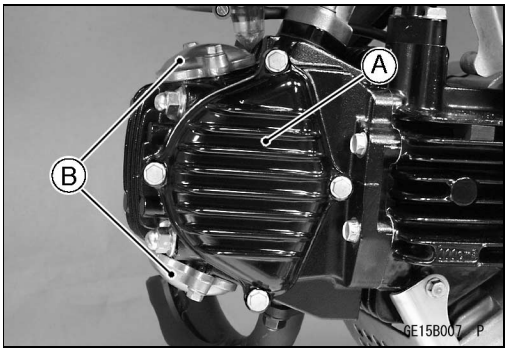
If valve clearance is left unadjusted, wear will eventually cause the valves to remain partly open, which lowers performance, burns the valves and the valve seats, and may cause serious engine damage.

NOTE

- *Valve clearance must be checked when the engine is cold (at room temperature).*

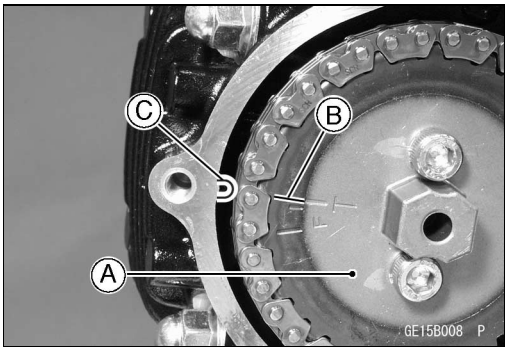
Valve Clearance (when engine cold)
Inlet and Exhaust: 0.04 ∼ 0.08 mm

- Remove:
  Left Shroud
  Spark Plug (see Electrical System chapter)
  Camshaft Sprocket Cover [A] (see Camshaft Sprocket Removal in the Engine Top End chapter.)
  Valve Adjusting Covers [B] (see Rocker Arm Removal in the Engine Top End chapter.)

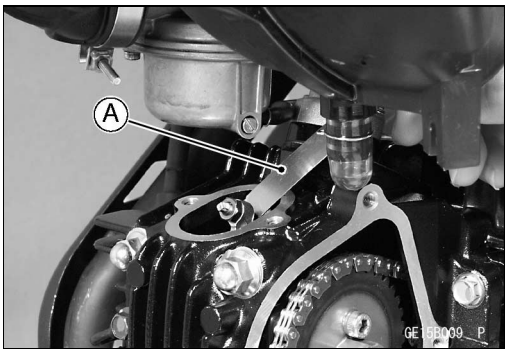


Periodic Maintenance Procedures

● Turn the camshaft sprocket plate [A] counterclockwise and align the line [B] on the camshaft sprocket with the projection [C] on the mating surface of the cylinder head.



● Measure the clearance of each valve by inserting a thickness gauge [A] between the adjusting screw and the valve stem.
★If a valve clearance is incorrect, adjust it.
● Install the other removed parts.



Valve Clearance Adjustment

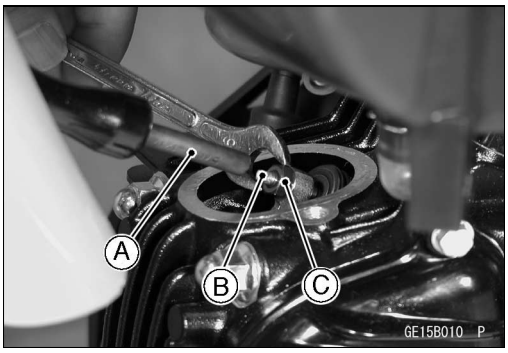
● Use a valve adjusting screw holder [A] to holding the valve adjusting screw [B], loosen the adjusting screw locknut [C] and insert the 0.05 mm thickness gauge between valve and adjusting screw and turn the adjusting screw until the adjusting screw stops.

Special Tools - Valve Adjusting Screw Holder: 57001–1217

● Tighten the locknut.

Torque - Adjusting Screw Locknut: 8.8 N·m (0.9 kgf·m, 78 in·lb)

● Remove the thickness gauge.

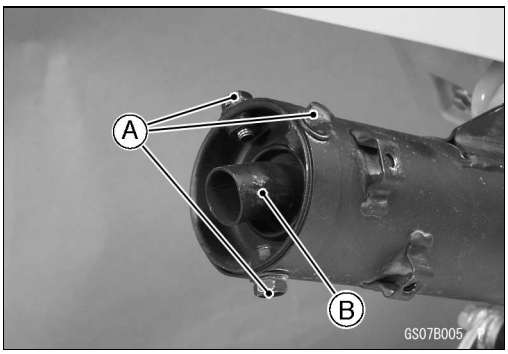


Spark Arrester Cleaning

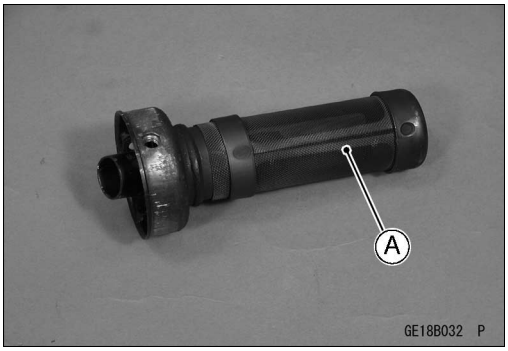
⚠WARNING

To avoid burns, be sure the exhaust system is cold before cleaning the spark arrester. The exhaust system becomes very hot soon after the engine is started.

● Remove the muffler cover.
● Unscrew the mounting bolts [A] and pull out the spark arrester [B].



● Scrape carbon deposits off the spark arrester [A].



● Install the spark arrester and torque the spark arrester mounting bolts.

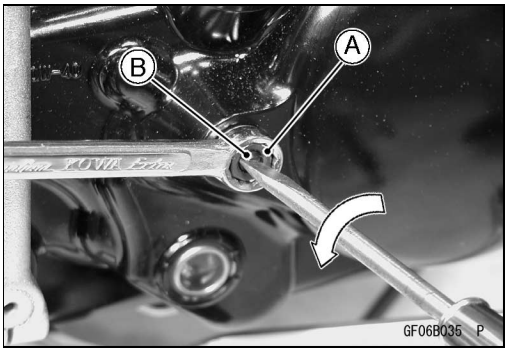
Torque - Spark Arrester Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)

● Install the muffler cover.

Clutch

Clutch Adjustment

● Loosen the adjusting screw locknut [A].
● Turn the adjusting screw [B] counterclockwise until it becomes hard to turn, and then back it out a quarter turn.



● Tighten the locknut without changing the adjusting screw position.
● Start the engine and inspect the conditions of clutch while shifting the pedal a few times.

Torque - Adjusting Screw Locknut: 19 N·m (1.9 kgf·m, 14 ft·lb)

Engine Lubrication System

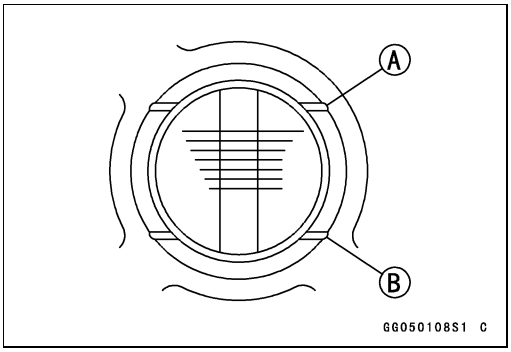
In order for the transmission and clutch to function properly, always maintain the engine oil at the proper level and change the oil periodically.

⚠ WARNING

Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated, wear and may result in transmission seizure, accident, and injury.

Oil Level Inspection

● To check the oil level, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Then stop the engine and wait several minutes until the oil settles.
● If the motorcycle has just been used, wait several minutes for all the oil to drain down.
● Situate the motorcycle so that it is perpendicular to the ground.
● Check that the engine oil level is between the upper [A] and lower [B] levels in the gauge.
★ The oil level should be between the lines next to the gauge.
★ If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
★ If the oil level is too low, add oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

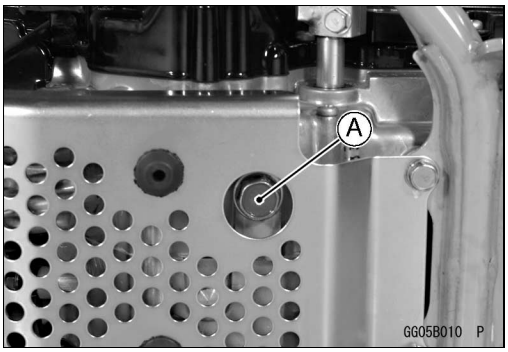


NOTE

○ *If the oil must be refilled but the type and brand of the oil already in the engine are unidentified, change the oil in the engine completely.*

Oil Changing

● Support the motorcycle perpendicular to the ground.
● Warm up the engine thoroughly so that the oil will pick up any sediment and drain easily. Then stop the engine.
● Place an oil pan beneath the engine.
● Remove the engine oil drain plug [A] and the oil filler opening to drain the oil.
○ The oil in the oil filter can be drained by removing the filter.



Periodic Maintenance Procedures

- After the oil has completely drained, install the drain plug with its gasket.
★Replace the drain plug gasket with a new one if it is damaged.
- Tighten the drain plug.

Torque - Engine Oil Drain Plug: 29 N·m (3.0 kgf·m, 21 ft·lb)

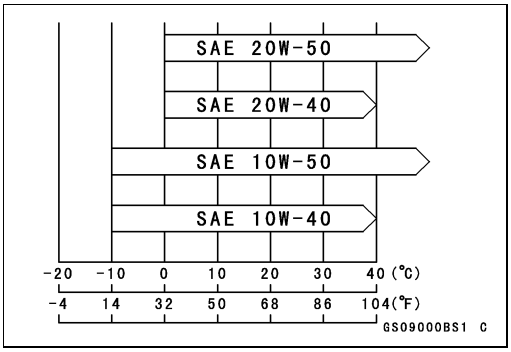
- Pour in the specified type and amount of oil.

Recommended Engine Oil

Type:	**API SE, SF or SG**
	API SH or SJ with JASO MA
Viscosity:	**SAE10W-40**
Capacity:	**1.1 L (When engine is completely dry)**
	1.0 L (When filter is removed)
	0.9 L (When filter is not removed)

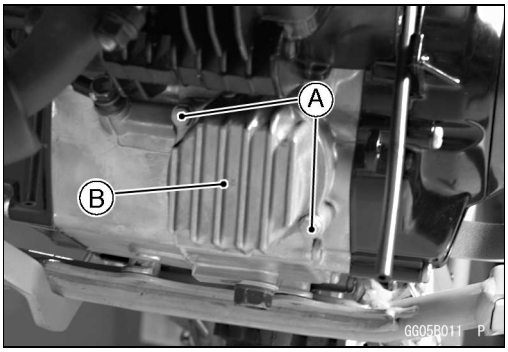
NOTE

○ *Depending on the atmospheric temperature of your riding area, the engine oil viscosity should be changed according to the right chart:*



Oil Filter Element Change

- Drain the engine oil.
- Remove the engine guard (see Engine Removal section in the Engine Removal/Installation chapter).
- Remove the oil filter cap bolts [A] and oil filter cap [B].



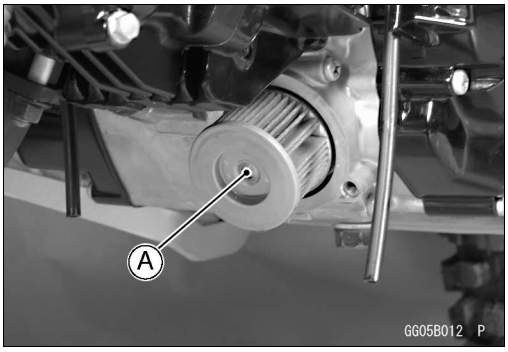
- Replace the filter element with a new one.
- Set the spring into the oil filter cap.

NOTE

○ *Install the filter element so that the bypass valve [A] side outward.*

- Fit a new O-ring onto the oil filter cap.
- Apply grease to the O-ring.
- Install the oil filter cap.

Torque - Oil Filter Cap Bolts: 5.2 N·m (0.53 kgf·m, 46 in·lb)



Wheels/Tires

Spoke Tightness Inspection

- Check that all the spokes [A] are tightened evenly.

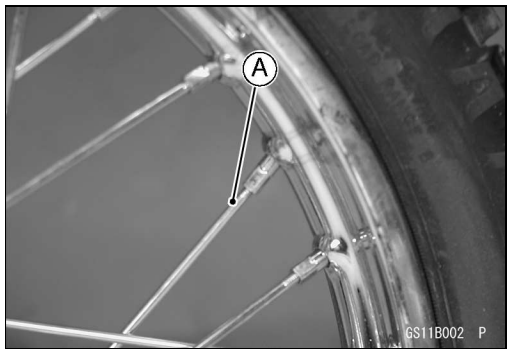
★Standard spoke tightening torque is shown below. Over- or under-tightening may cause breakage.

Tightening Torque

Spokes: **1.2 N·m**

(0.12 kgf·m, 10 in·lb)

- Check the rim runout.



⚠WARNING

If any spoke breaks, it should be replaced immediately. A missing spoke places an additional load on the other spokes, which will eventually cause other spokes to break.

Rim Runout Inspection

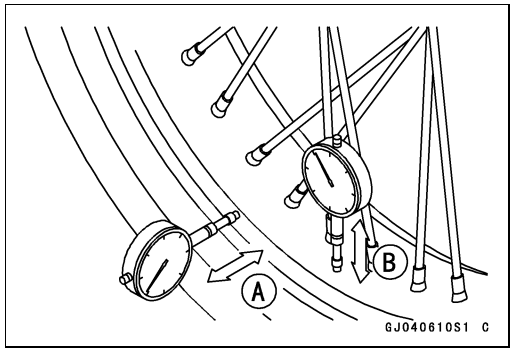
- Place the jack under the frame so that the front/rear wheel off the ground.

Special Tool - Jack: 57001–1238

- Inspect the rim for small cracks, dents, bending, or warping.

★If there is any damage to the rim, it must be replaced.

- Set a dial gauge against the side of the rim, and rotate the rim to measure axial runout [A]. The difference between the highest and lowest dial readings is the amount of runout.
- Set a dial gauge to the outer circumference of the rim, and rotate the rim to measure radial runout [B]. The difference between the highest and lowest dial readings is the amount of runout.
- If rim runout exceeds the service limit, check the hub bearing first. Replace them if they are damaged. If the problem is not to the bearings, correct the rim warp (runout). A certain amount of rim warp can be corrected by recentering the rim. Loosen some spokes and tighten others within the standard torque to change the position of different parts of the rim. If the rim is badly bent, however, it should be replaced.



Rim Runout (with tire installed)

	Standard	Service Limit
Axial:	**0.5 mm or less**	**2 mm**
Radial:	**0.8 mm or less**	**2 mm**

Periodic Maintenance Procedures

Final Drive

Chain Slack Inspection

- Support the mortorcycle perpendicular to the ground.

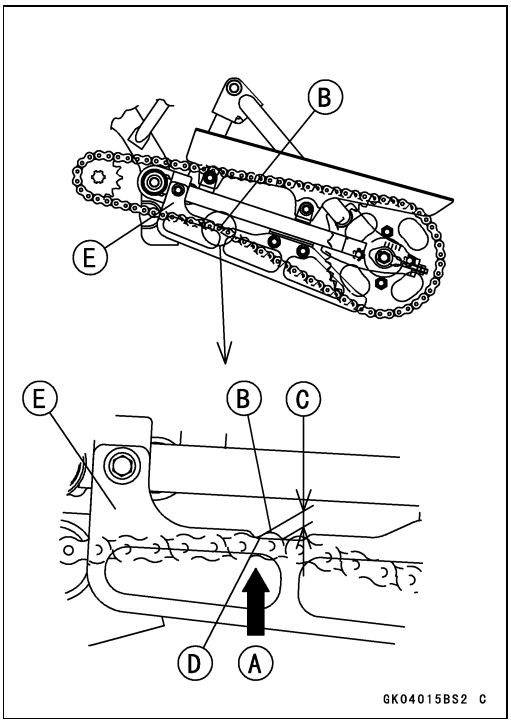
NOTE

○ *Clean the drive chain if it is dirty, and lubricate it if it appears dry.*

- Rotate the rear wheel to find the position where the chain is tightest.
- Push up [A] the chain midway between the engine sprocket and rear sprocket.
- The drive chain slack is that the drive chain [B] is pushed out within 0 ∼ 5 mm [C] from the hollow [D] of the chain guard [E].

★If the drive chain slack exceeds the standard, adjust it.

Chain Slack
Standard: 0 ∼ 5 mm



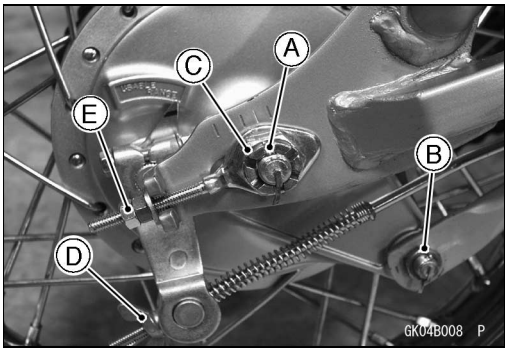
Chain Slack Adjustment

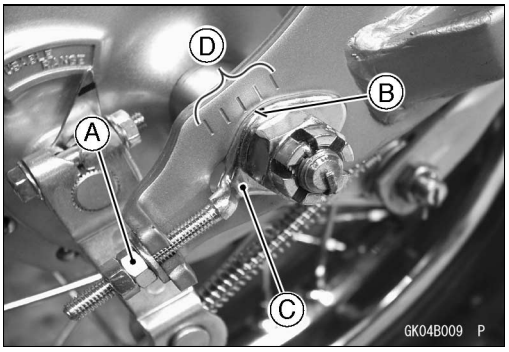
- Remove:
  Cotter Pin [A]
- Loosen:
  Rear Torque Link Nut [B]
  Axle Nut [C]
  Brake Adjusting Nut [D]
  Right and Left Chain Adjuster Locknuts [E]

CAUTION

If you don't loosen the torque link nut, it may lead to the brake parts damage when the adjusters are set.

- If the chain is too tight, back out the left and right chain adjusting nuts [A] evenly, and kick the wheel forward until the chain is too loose.
- Turn both chain adjusting nuts evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned, the notch [B] on the right chain adjuster [C] should align with the same swingarm mark [D] that the left chain adjuster notch aligns with.





- Tighten both chain adjuster locknuts.
- Tighten the axle nut.

Tightening Torque - Rear Axle Nut: 64 N·m (6.5 kgf·m, 47 ft·lb)

- Rotate the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
- Insert a new cotter pin for the axle nut and spread its ends.
- Tighten the rear torque link nut securely.

Tightening Torque - Rear Torque Link Nut: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Insert a new cotter pin for the rear torque link nut and spread its ends.

⚠ WARNING

If the axle and torque link nuts are not securely tightened and the cotter pins are not installed, an unsafe riding condition may result.

- Check the rear brake play referring to brakes section in this chapter.

Chain Wear Inspection

- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.
- Also inspect the sprockets for unevenly or excessively worn teeth, and damaged teeth.

NOTE

○ *Sprocket wear is exaggerated for illustration (see Sprocket Wear Inspection in this chapter).*

★ If there is any irregularity, replace the drive chain and sprockets.
- If the chain appears dry, lubricate it.
- Remove the chain cover.

- Stretch the chain taut by hanging a 98 N (10 kg, 20 lb) weight [A] on the chain.
- Measure the length of 20 links [B] on the straight part [C] of the chain from pin center of the 1st pin to pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.

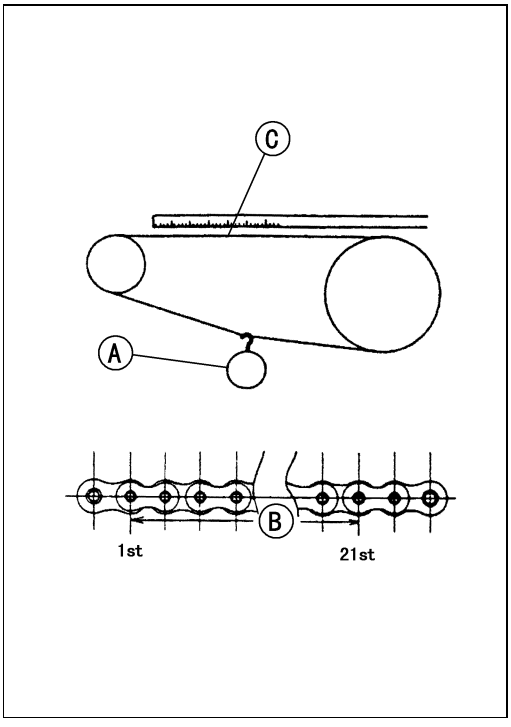
★ If any measurements exceeds the service limit, replace the chain. Also, replace the engine and rear sprockets when the drive chain is replaced.

⚠ WARNING

If the drive chain wear exceeds the service limit, replace the chain or an unsafe riding condition may result. A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. For safety, use only the standard chain.

Drive Chain 20–Link Length

Standard:	**254.0 ∼ 254.6 mm**
Service Limit:	**259 mm**

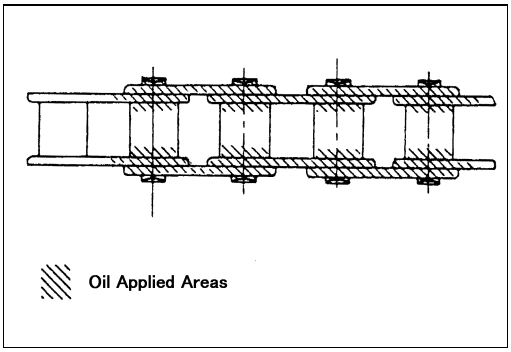


Periodic Maintenance Procedures

Chain Lubrication

The chain should be lubricated with a lubricant which will both prevent its exterior from rusting and also absorb shock and reduce friction in the interior of the chain. An effective, good quality lubricant specially formulated for chains is best for regular chain lubrication. If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.

- If the chain appears especially dirty, it should be cleaned before lubrication.
- Apply oil to the sides of the rollers and between the side plates of the links so that oil will penetrate to the bushings and pins where most wear takes place.
- Wipe off any excess oil.

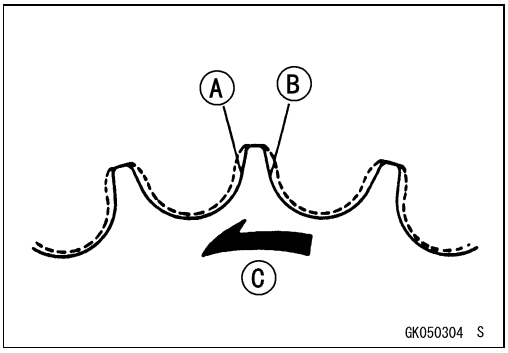


Sprocket Wear Inspection

- Visually inspect the engine and rear sprocket teeth for wear and damage.

★If they are worn as illustrated or damaged, replace the sprocket with new ones and inspect the drive chain wear.

Worn Tooth (Engine Sprocket) [A]
Worn Tooth (Rear Sprocket) [B]
Direction of Rotation [C]

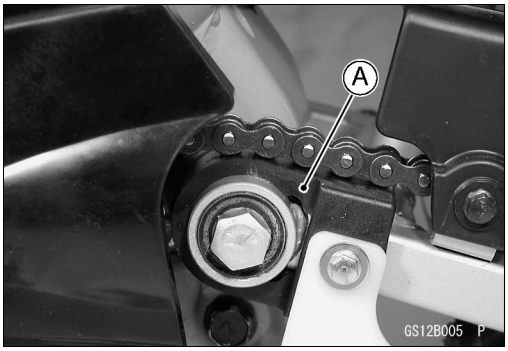


NOTE

○ *If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.*

Chain Slipper Wear Inspection

- Visually inspect the chain slipper [A] on the swingarm and replace it if worn or damaged.



Brakes

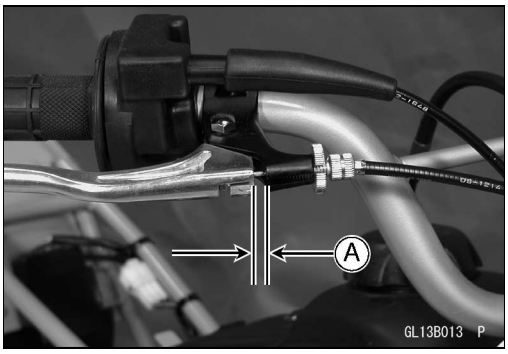
Brake Lever, Brake Pedal Free Play Inspection

- Check the front brake lever free play [A] when the brake is lightly applied.

Lever Free Play
Standard: 4 ∼ 5 mm

★If the lever has improper play, adjust it.

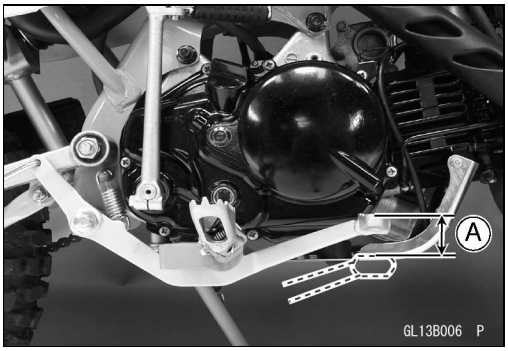
- Operate the lever a few times to see that it returns to its rest position immediately upon release.



Periodic Maintenance Procedures

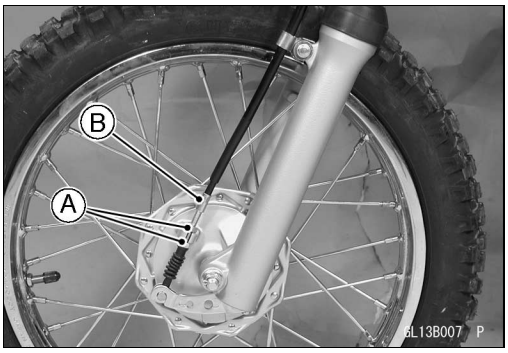
● Check the brake pedal free play [A] when the pedal is pushed down lightly by hand.

Brake Pedal Free Play
Standard: 20 ∼ 30 mm



★If the pedal has improper play, adjust it.
● Operate the pedal a few times to see that it returns to its rest position immediately upon release.
● Rotate the rear wheel to check for brake drag.
● Check braking effectiveness.
★If there is any doubt as to the conditions of the brake, check the brake parts for wear or damage.

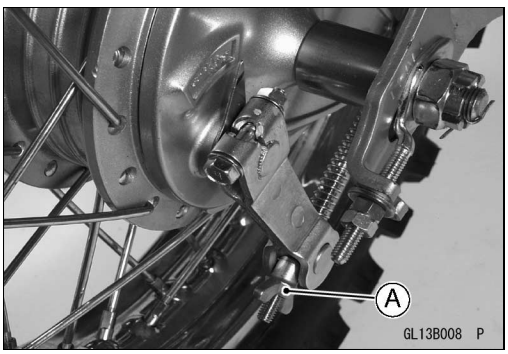
Front Brake Free Play Adjustment
● Loosen the locknut at the front brake lever, screw the adjuster fully in, and tighten the locknut.
● Loose the nuts [A] at the lower end of the brake cable.
● Turn the nuts at the lower end of the front brake cable so that the brake lever has the correct amount of play, and tighten the nuts.
● If sufficient adjustment can not be made with the adjuster [B], complate the adjustment with the adjuster at the brake lever, and then tighten the locknut.
● Check for brake drag.
● Check braking effectiveness.
● Slide the dust cover back into place.



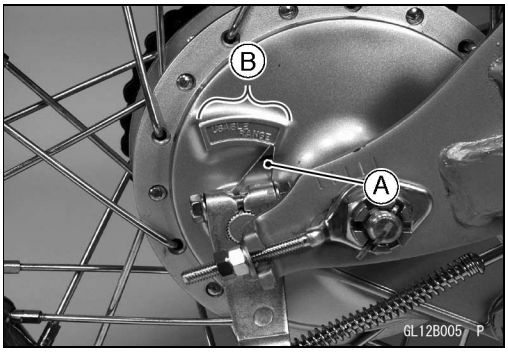
NOTE

○ *For minor corrections, use the adjuster at the front brake lever.*
○ *If the brake lever adjustment cannot be made with the adjuster at the brake lever or the brake panel, move the front brake cam lever to a new position on the brake camshaft.*

Brake Pedal Free Play Adjustment
● Turn the adjusting nut [A] at the brake cam lever so that the pedal has proper play.



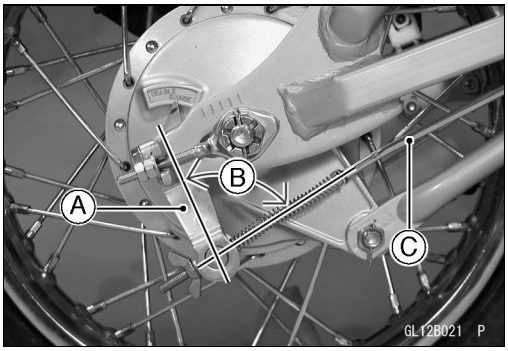
Brake Lining Wear Inspection
● Check the brake lining wear indicator [A] (only rear brake) points within the USABLE RANGE [B] when the brake is fully applied.
★If does not, the brake shoes must be immediately replaced and the other brake parts examined.



Periodic Maintenance Procedures

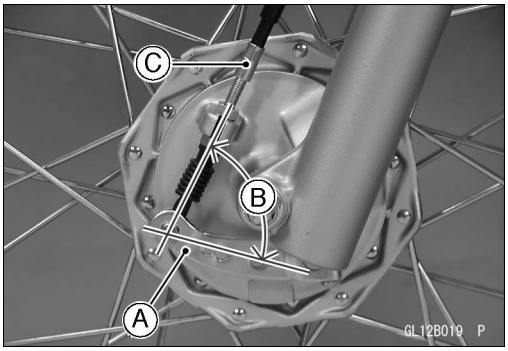
● Check that the brake cam lever [A] comes to an 80° ~ 90° angle [B] with the brake rod or cable [C] when the brake is fully applied.
★If it does not, adjust the brake cam lever angle.

Cam Lever Angle
Standard: 80° ~ 90°



⚠ WARNING

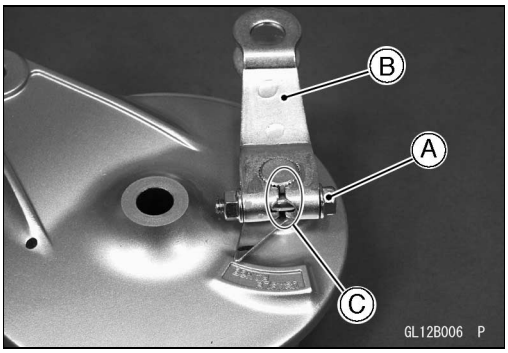
Since a cam lever angle greater than 90° reduces braking effectiveness, cam lever angle adjustment should not be neglected.



Cam Lever Angle Adjustment

CAUTION

Do not depress the brake pedal deeply in order to separate the brake rod from the brake cam lever joint, this may extend the brake spring beyond its allowable spring extension.
Rotate the rear brake panel clockwise as far as it will go with the brake rod inserted into the brake cam lever joint, then depress the brake pedal lightly, the brake rod will be separated from the brake cam lever joint.



● Remove the wheel (see Wheels/Tires chapter).
● Remove the bolt [A], and take off the cam lever [B].
○ Before removing the brake cam lever, mark [C] on the cam lever and camshaft at the same position.
● Mount the cam lever at a new position so that the cam lever has a proper angle when the brake is fully applied.

Cam Lever Angle
Standard: 80° ~ 90°

Torque - Rear Cam Lever Mounting Bolt: 7 N·m (0.7 kgf·m, 60 in·lb)

⚠ WARNING

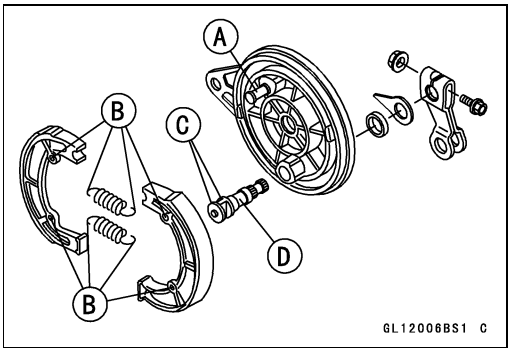
When remounting the cam lever, be sure that the position of the wear indicator on the serrated shaft is not altered.
A change in cam lever angle is caused by wear of internal brake parts. Whenever the cam lever angle is adjusted, also check for drag and proper operation, taking particular note of the brake lining wear indicator position.
In case of doubt as to braking effectiveness, disassemble and inspect all internal brake parts. Worn parts shall result in the brake to lock or fail.

● Install the wheel (see Wheels/Tires chapter).
● Adjust the brake free play.

Periodic Maintenance Procedures

Brake Panel Lubrication

- Disassemble the rear brake panel (see Brakes chapter).
- Clean all old grease out of the brake parts with a cloth.
- Apply high-temperature grease to the following.
  Brake Shoe Anchor Pin [A]
  Spring Ends [B]
  Cam Surfaces [C]
  Cam Shaft Groove [D]



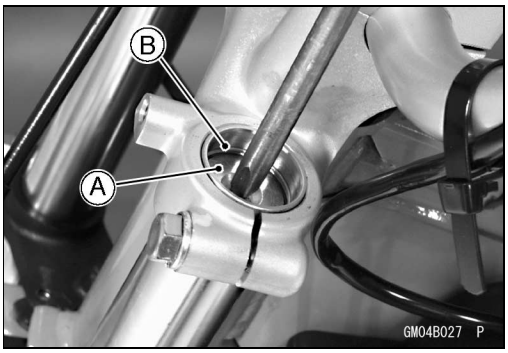
Suspension

Fork Oil Level Adjustment (Simplify)

- Using the jack under the frame, and stabilize the motorcycle.

  Special Tool - Jack: 57001–1238

- Remove the number plate.
- Remove the cap from the top of the fork tubes, and push down the top plug [A] and remove the circlip [B] from each fork tube.
- Pull out the top plug and spring.



- Place a stand the engine to raise the front wheel the ground.
- Slowly compress the front fork fully by pushing up the outer tubes [A] using a jack or other suitable means under the front wheel.
- Place a stand or other suitable support [B] under the front wheel.

- Use the oil level gauge to measure the fork oil level.

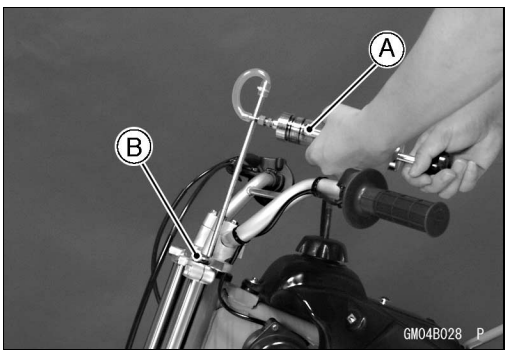
○ With the fork fully compressed, put the oil level gauge [A] and the stopper [B], and adjust the distance from the top of the inner tube to oil.

Special Tool - Fork Oil Level Gauge : 57001–1290

Front Fork Oil Level (fully compressed, without spring)
Standard: 89 ± 2 mm

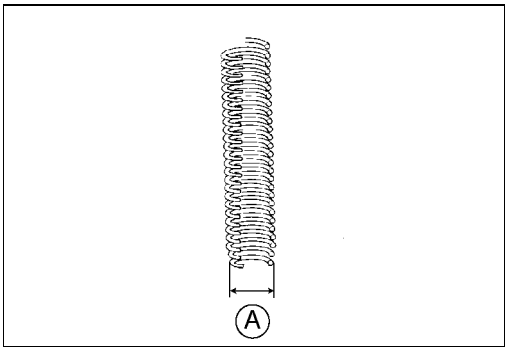
★ If no oil is drawn out, there is insufficient oil in the fork tube. Pour in enough oil, then pump out the excess oil.

Recommended Fork Oil: SS-8 or SAE10W20

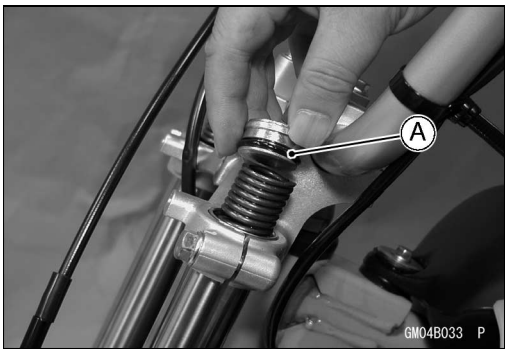


Periodic Maintenance Procedures

● Measure the both diameters of the fork spring ends and insert the fork spring with the small diameter end [A] facing down.



● Check both top plug O-ring [A] for damage and replace them if necessary.



● Push down the top plug and install the circlip.
● Assemble the other fork tube in the same way as described above.
● Install the parts removed.

Front Fork Inner Tube Inspection

● Visually inspect the front fork for oil leakage, damage on the outer surface of the inner tube [A].
★ If necessary, repair any damage.
● Nick or rust damage can sometimes be repaired by using a wet-stone to remove sharp edges or raised areas which cause seal damage.
★ If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.
● Temporarily assemble the inner and outer tubes, and pump them back and forth manually to check for smooth operation.

CAUTION

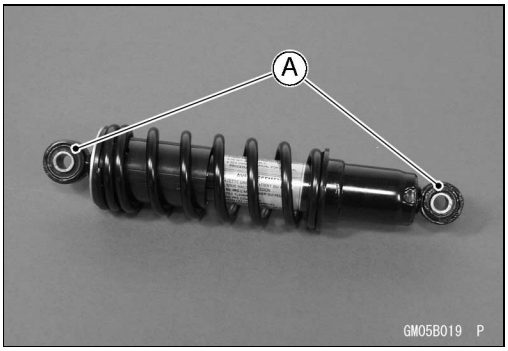
If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

Rear Shock Absorber Inspection

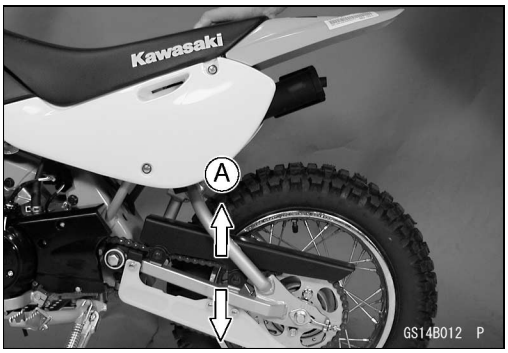
Since the rear shock absorber is sealed units which cannot be disassembled, only external checks of operation are necessary.

● With the shock absorber removed, compress it and see that the compression stroke is smooth and that there is damping in addition to spring resistance to compression. When the unit is released, the spring should not suddenly snap it to full length. It should extend smoothly with notable damping. When the shock absorber is operated, there should be no oil leakage.

● Check the rubber bushings [A].
★ If they are worn, cracked, hardened, or otherwise damaged, replace them.



Swingarm Pivot Inspection
● Check for wear or damage to the shock absorber and the swing arm mount pivot point while compressing [A] the rear suspension a few times.

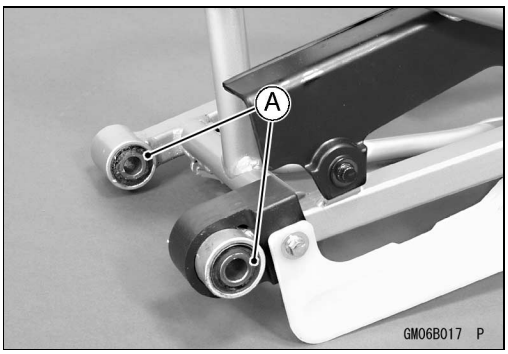


● Using the jack under the frame so that the rear wheel is raised off the ground.

Special Tool - Jack: 57001–1238

● Move the swingarm [A] side to side to check for worm, damaged or loose suspension pivot components.
★ If any play is detected, check for looseness of swingarm pivot bolt or for damage to the swingarm rubber bushings.

Swingarm Rubber Bushing Inspection
● Visually inspect the rubber bushings [A].
★ If they are deteriorated or damaged, replace them.



Steering

Steering Inspection
● Using he jack, raise the front wheel off the ground.

Special Tool - Jack: 57001–1238

● With the front wheel pointing straight ahead, alternately nudge each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork this the stop.
★ If the steering binds or catches before the stop, check the routing of the cables, hoses, and harnesses.
★ If the steering feels tight, adjust or lubricate the steering.
● Feel for steering looseness by pushing and pulling [A] the forks.
★ If you feel looseness, adjust the steering.

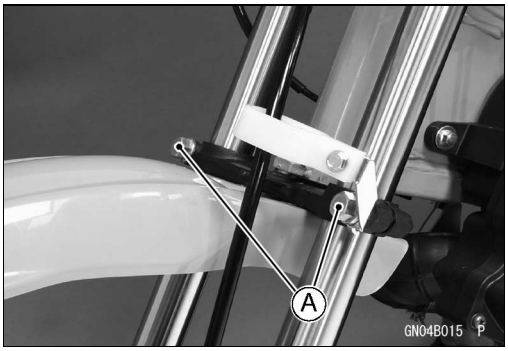
Periodic Maintenance Procedures

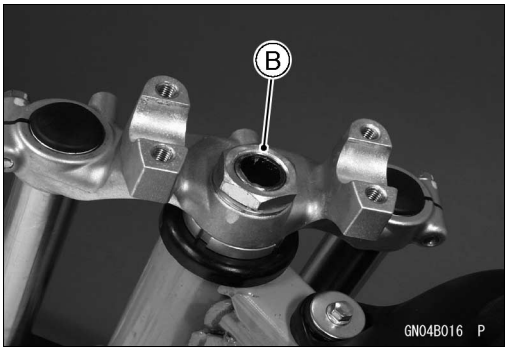
Steering Adjustment

- Remove the number plate.
- Using the jack, raise the front wheel off the ground.

Special Tool - jack: 57001–1238

- Remove the handlebar.
- Loosen the front fork lower clamp bolts [A] and steering stem head nut [B].





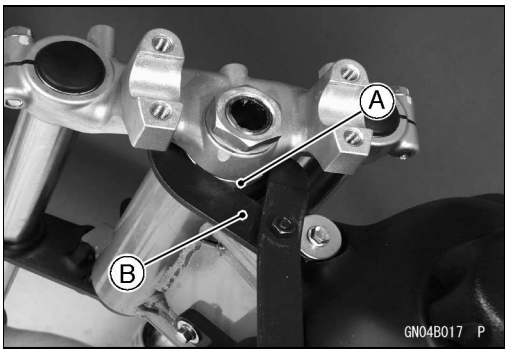
- Turn the steering stem locknut [A] with the steering stem nut wrench [B] to obtain the proper adjustment.

★If the steering is too tight, loosen the stem locknut a fraction of a turn; if the steering is too loose, tighten the locknut a fraction of a turn.

Special Tool - Steering Stem Nut Wrench: 57001–1100

NOTE

○ *Turn the locknut 1/8 turn at a time maximum.*

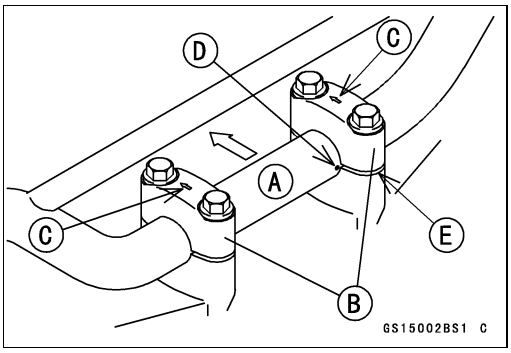


- Tighten the following:

Torque - Steering Stem Head Nut: 44 N·m (4.5 kgf·m, 32 ft·lb)
Front Fork Lower Clamp Bolts: 29 N·m (3.0 kgf·m, 22 ft·lb)

- Mount the handlebar clamps [B] so that the arrows [C] on the clamp point at the front [A].

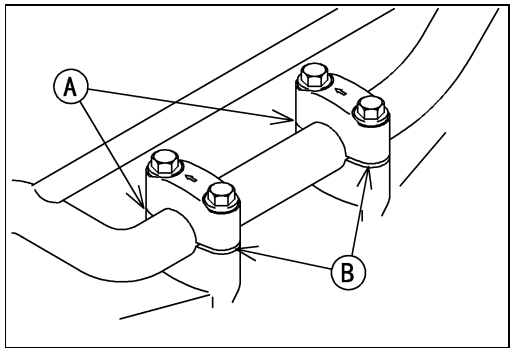
○ Align a gap [E] at the rear with the punch mark [D] on the handlebar.



● Torque the handlebar clamp bolts.

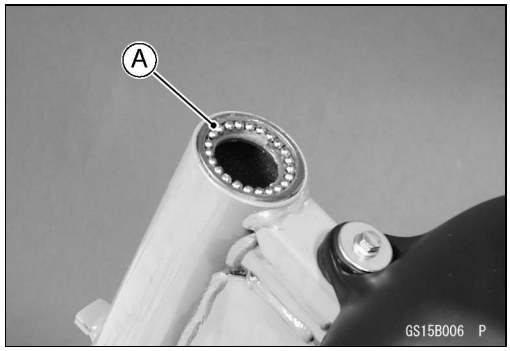
Torque - Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

○ Tighten the clamp bolts, front first and then the rear. If the handlebar clamp is correctly installed, there will be no gap [A] at the front and a gap [B] at the rear after tightening.



Steering Stem Bearing Lubrication

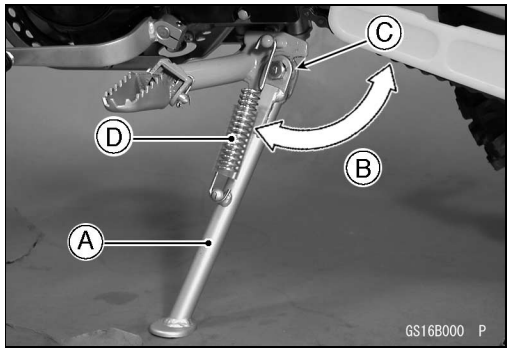
● Remove the steering stem (see Steering chapter).
● Wipe the old grease off the races and balls, washing them in a high-flash point solvent if necessary.
★ Replace the bearing part if they show wear or damage.
★ Apply grease liberally to the upper and lower races, and stick the bearing balls in place with grease. There are 23 steel balls [A] installed in the upper or lower outer races.
★ Install the steering stem.
★ Adjust the steering.



Side Stand

Side Stand Inspection

● See if the side stand [A] moves smoothly and retracts fully [B].
★ If not, clean and grease the pivot [C].
● Check the side stand spring [D] for damage.
★ If necessary, replace the spring.

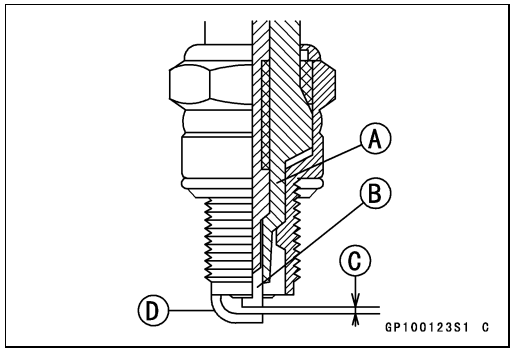


Electrical System

Spark Plug Gap

● Remove the spark plug (see Electrical System chapter).
● Measure the gap with a wire-type thickness gauge.
★ If the gap is incorrect, carefully bend the side electrode with a suitable tool to obtain the correct gap.
Insulator [A]
Center Electrode [B]
Plug Gap [C]
Side Electrode [D]

Spark Plug Gap
0.6 ∼ 0.7 mm



Spark Plug Cleaning and Inspection

● Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using a high flash-point solvent and a wire brush or other suitable tool.
★ If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard spark plug.

Periodic Maintenance Procedures

General Lubrication

Lubrication

- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

NOTE

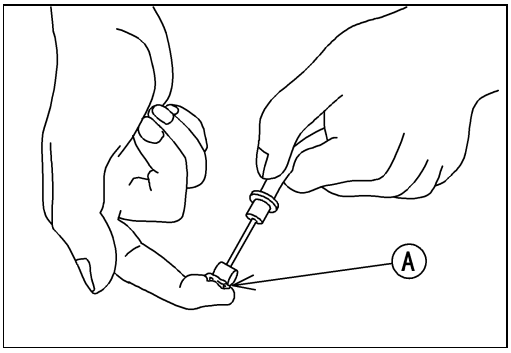
○ *Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.*

Pivots: Lubricate with Motor Oil.

Brake Lever
Kick Pedal
Brake Pedal
Brake Rod Joint
Drive Chain

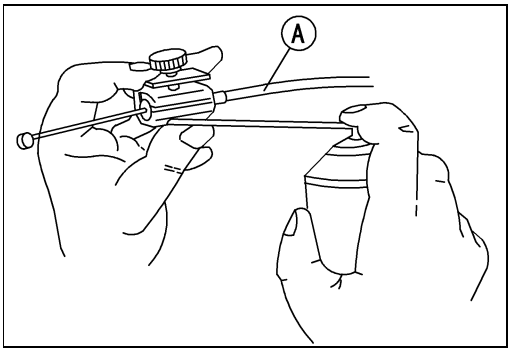
Points: Lubricate with Grease [A].

Throttle Cable Upper End
Choke Cable Lower End
Side Stand Pivot
Steering Stem Bearing



Cables: Lubricate with Rust Inhibitor.

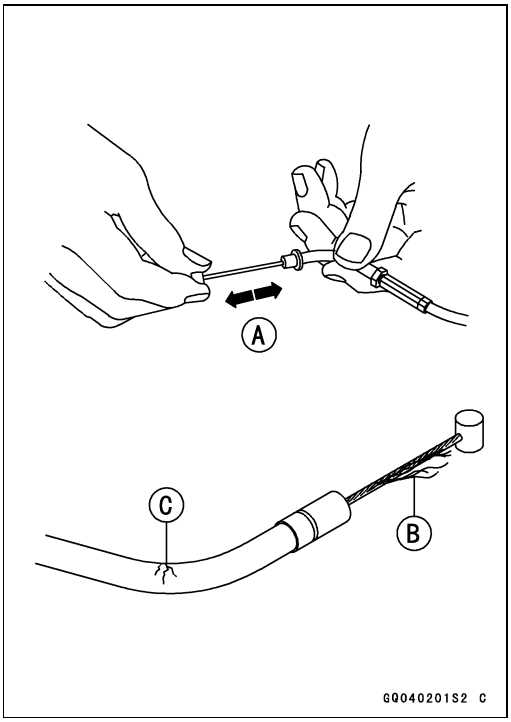
Throttle Cable [A]
Choke Cable
Front Brake Cable



Periodic Maintenance Procedures

- With the cable disconnected at the both ends, the cable should move freely [A] within the cable housing.

★ If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.



Nut, Bolt and Fastener Tightness

Tightness Inspection

● Check the tightness of bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

NOTE

○ *For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).*

★ If there are loose fasteners, retorque them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by 1/2 turn, then tighten it.

★ If cotter pins are damaged, replace them with new ones.

Nut, Bolt and Fastener to be checked

Wheels:
- Spoke Nipples
- Front Axle Nut Cotter Pin
- Front Axle Nut
- Rear Axle Nut Cotter Pin
- Rear Axle Nut

Final Drive:
- Chain Adjuster Locknuts
- Rear Sprocket Nuts

Brakes:
- Front Brake Adjusting Nut
- Rear Brake Adjusting Nut
- Brake Lever Pivot Nut
- Brake Pedal Bolt
- Brake Rod Joint Cotter Pin
- Torque Link Nut
- Torque Link Nut Cotter Pin

Suspension:
- Front Fork Clamp Bolts
- Swingarm Pivot Shaft Nut
- Rear Shock Absorber Mounting Bolts and Nuts

Steering:
- Stem Head Nut
- Handlebar Clamp Bolts

Engine:
- Engine Mounting Bolts, Nuts
- Cylinder Head Bolts and Nuts
- Shift Pedal Bolts
- Exhaust Pipe Holder Nuts
- Muffler Bolt and Nut

Others:
- Side Stand Bolt
- Footpeg Mounting Bolts

Fuel System

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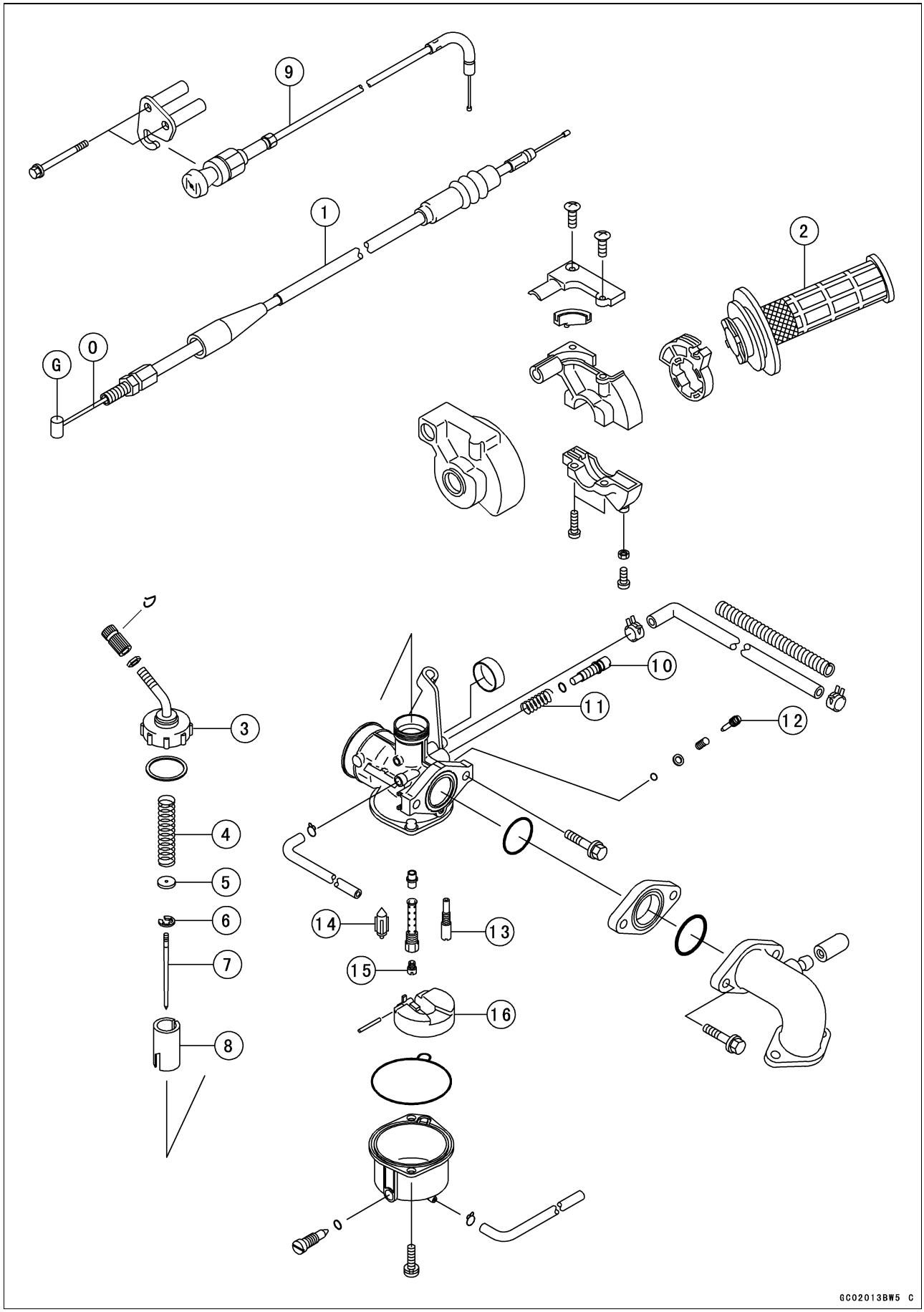
Exploded View

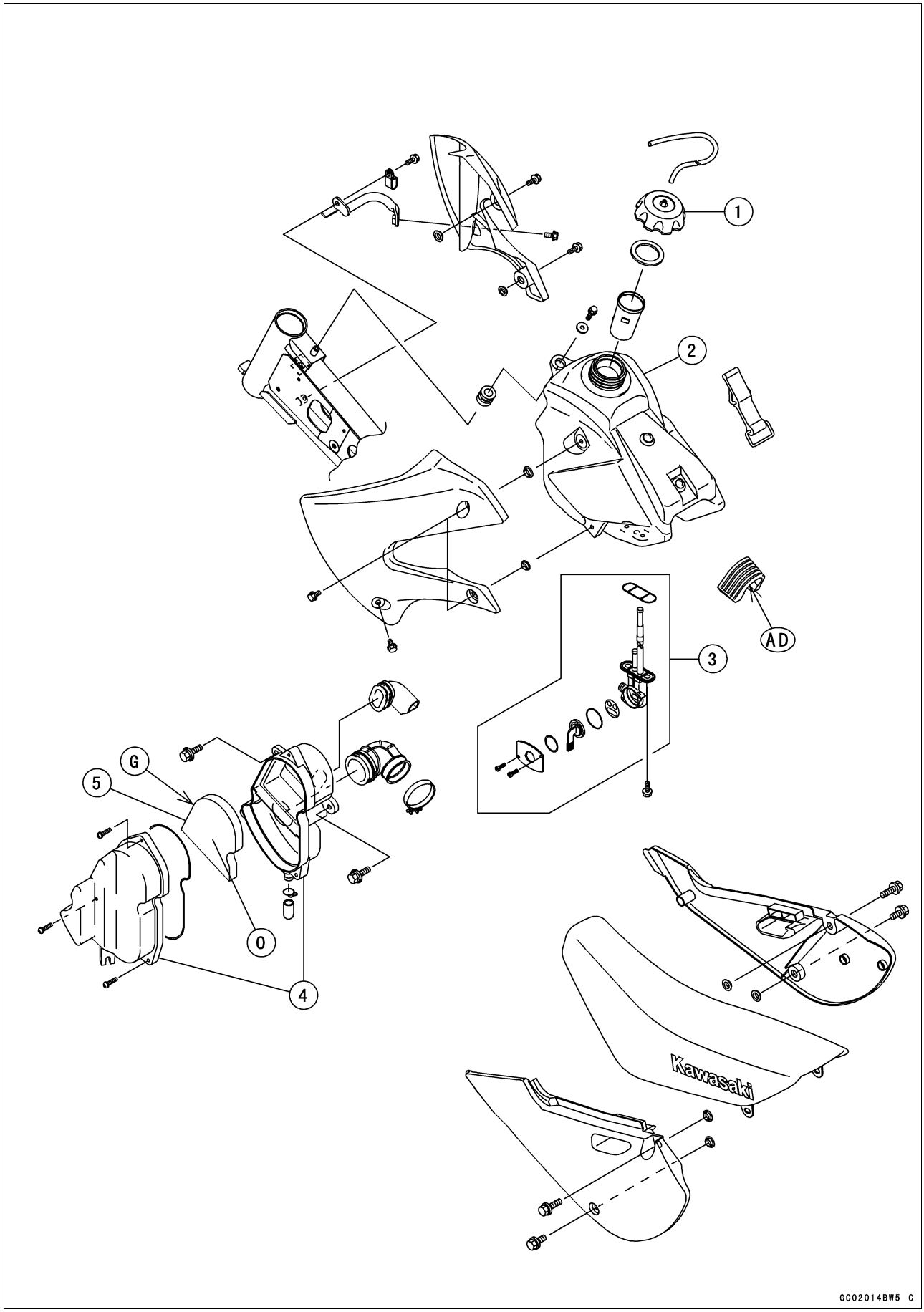


Exploded View

1. Throttle Cable
2. Throttle Grip
3. Carburetor Cap
4. Spring
5. Retainer
6. Circlip
7. Jet Needle
8. Throttle Valve
9. Choke Cable
10. Idle Adjusting Screw
11. Spring
12. Air Screw
13. Pilot Jet
14. Float Valve Needle
15. Main Jet
16. Float

O: Apply oil.
G: Apply grease.

Exploded View



Exploded View

1. Fuel Tank Cap
2. Fuel Tank
3. Fuel Tap
4. Air Cleaner Housing
5. Element

G: Apply grease.
O: High-quality foam-air filter oil
AD: Apply adhesive.

3-6 FUEL SYSTEM

Specifications

Item	Standard	Service Limit
Throttle Grip and Cable:		
Throttle grip free play	2 ∼ 3 mm	- - -
Carburetor:		
Make/Type	KEIHIN PB18	- - -
Main jet:	#80	- - -
Jet needle	NCFA	- - -
Throttle valve cutaway	3.0	- - -
Pilot jet	#38/38	- - -
Air screw	1 1/4 turns out	- - -
Idle speed	1250 ∼ 1350 r/min (rpm)	- - -
Service fuel level	3.0 ± 1 mm (below the bottom edge of carburetor body	- - -
Float height	10.7 ± 2 mm	- - -
Air Cleaner:		
Air cleaner element oil	High-quality foam-air filter oil	- - -

Special Tools - Fuel Level Gauge: 57001–1017

Throttle Grip and Cable

Free Play Inspection

○ Refer to Free Play Inspection in the Periodic Maintenance Chapter.

Free Play Adjustment

○ Refer to Free Play Adjustment in the Periodic Maintenance Chapter.

Throttle Cable and Choke Cable Installation

- Install the throttle cable and choke cable in accordance with the Cable, Harness, Hose Routing section in the General Information chapter.
- After the installation, adjust each cable properly.

⚠WARNING

Operation with an incorrectly routed or improperly adjusted cable result in an unsafe riding condition.

Cable Lubrication and Inspection

- Whenever the choke cable or the throttle cable are removed or in accordance with the Periodic Maintenance Chart, lubricate the these cables. Refer to General Lubrication in the Periodic Maintenance Chapter.

○ Apply a thin coating of grease to the cable upper or lower ends.

○ Use a commercially available pressure cable lubricator to lubricate these cables.

○ With the cable disconnected at both ends, the cable should move freely in the cable housing.

Carburetor

Idle Speed Inspection

○ Refer to Idle Speed Inspection in the Periodic Maintenance Chapter.

Idle Speed Adjustment

○ Refer to Idle Speed Adjustment in the Periodic Maintenance Chapter.

Fuel Level Inspection

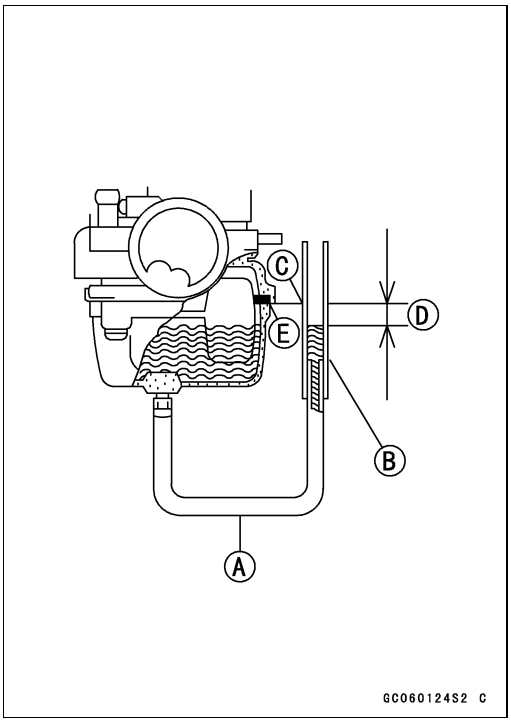
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well-ventilated and from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove the carburetor, and hold them in true vertical position on a stand.
- Put the fuel tank on a bench, and connect the fuel tap to the carburetor using a suitable hose.
- Prepare a rubber hose [A].
- Connect the fuel gauge [B] to the carburetor float bowl with the rubber hose.

Special Tool - Fuel Level Gauge: 57001–1017

- Hold the gauge vertically against the side of the carburetor body so that the "middle" line [C] is several millimeters higher than the bottom edge of the carburetor body.
- Turn the fuel tap to the ON position to feed fuel to the carburetor, then turn out the carburetor drain plug a few turns.
- Wait until the fuel level [D] in the gauge settles.
- Keeping the gauge vertical, slowly lower the gauge until the "middle" line is even with the bottom edge [E] of the carburetor body.



NOTE

○ *Do not lower the "middle" line below the bottom edge of the carburetor body. If the gauge is lowered and then raised again, the fuel level measure shows somewhat higher than the actual fuel level. If the gauge is lowered too far, dump the fuel out of it into suitable container and start the procedure over again.*

- Read the fuel level in the gauge and compare it to the specification.

Fuel Level
3.0 ± 1 mm below the bottom edge of carburetor body

- Screw in the carburetor drain plug.
- Turn the fuel tap to the OFF position and remove the fuel level gauge.

★ If the fuel level is incorrect, the float level can not be adjusted on this model. Inspect the float, float valve needle, and the contacting surface between the carburetor body and its float valve needle. If they are damaged, replace them.

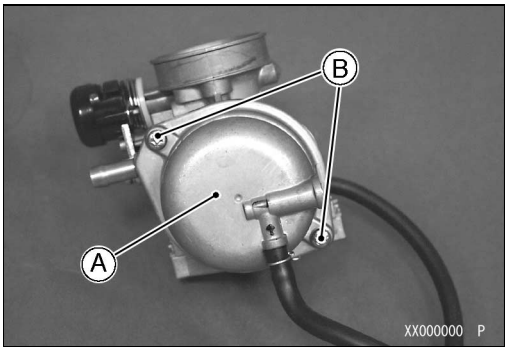
- Install the carburetor.

Carburetor

Fuel Level Adjustment

⚠ WARNING

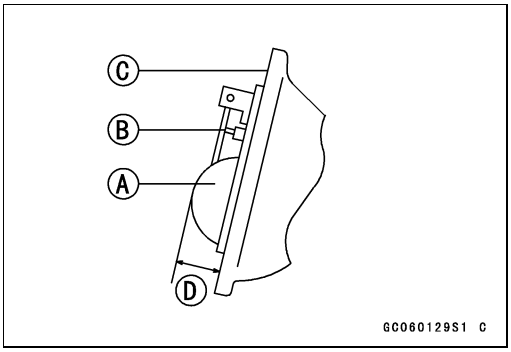
Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well-ventilated and from any source of flame or sparks; this includes any appliance with a pilot light.



- Remove the carburetor, drain the fuel into a suitable container.
- Remove the float bowl [A] taking out the screws [B] with lockwashers.
- Check the float level.
  [A] Float
  [B] Float Valve Needle Rod (contacted but unloaded).
  [C] Float bowl mating surface
  [D] Float height

Float Height
10.7 ± 2 mm

★If the float height is incorrect, the float height can not be adjusted on this model. Inspect the float, float valve needle,



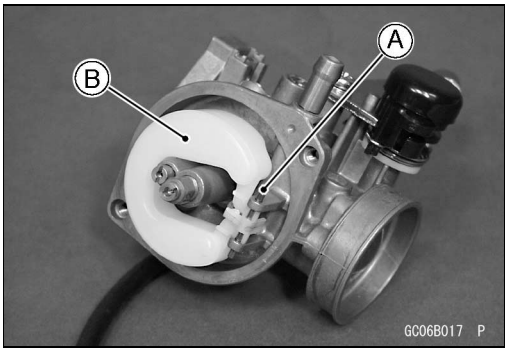
NOTE

○ *Float height is the distance from the float bowl mating surface of the carburetor body (with the gasket removed) to the top of the float.*

○ *Do not push the needle rod in during the float height measurement. Measure the height with the carburetor upside down.*

Float Removal

- Remove the carburetor and disassembly the float bowl.
- Drive out the pivot pin [A] and remove the float [B] and float valve as a set.



Fuel System Cleanliness Inspection

⚠ WARNING

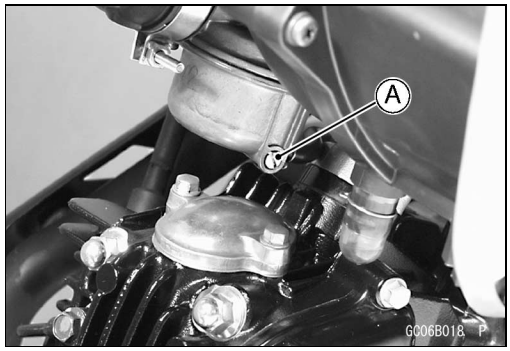
Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.
Make sure the engine is cold before working. Wipe any fuel off the engine before starting it.

Carburetor

- Using a screwdriver, turn out the drain plug [A] a few turns and drain the carburetor to a suitable container and check to see if water or dirt come out.

★If any water or dirt appears during the above inspection, clean the fuel system.

- Tighten the drain plug securely.

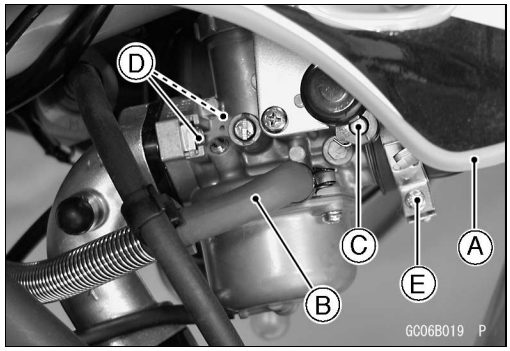


Carburetor Removal

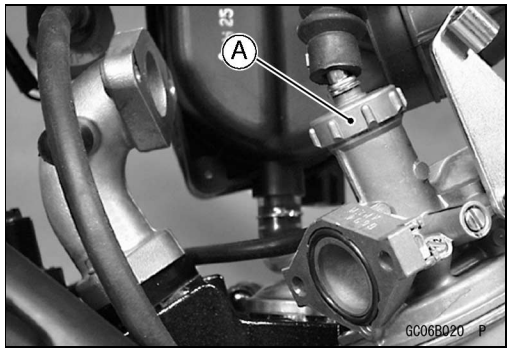
⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Turn the fuel tap to the OFF position.
- Remove:
  Right Shroud [A]
  Tubes (carburetor side) [B]
  Choke Cable Lower End [C]
  Intake Pipe Bolts [D]
- Loosen the clamp screw [E].
- Remove the carburetor.
- Stuff pieces of lint-free, clean cloths into the carburetor holder and the air cleaner intake duct to keep the dirt out of the engine and air cleaner.



- Unscrew the cap [A] and pull out the throttle cable lower end with the throttle valve, spring and jet needle as a set.



⚠WARNING

If dirt or dust allowed to pass through into the carburetor, the throttle may become stuck, possibly causing an accident.

CAUTION

If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.
If the throttle valve is not removed from the cable, wrap clean cloths around the throttle valve to avoid damaging to it.

Carburetor Installation

- Installation is the reverse of removal.
- After installing the carburetor, perform the following.

○ Check fuel leakage from the carburetor.

⚠WARNING

Fuel spilled from the carburetor is hazardous.

○ Adjust the following.
  Idle Speed
  Throttle Grip Free Play

Carburetor

Carburetor Cleaning

⚠ WARNING

Clean the carburetor in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of high flammable liquids, do not use gasoline or low flash-point solvents to clean the carburetor.

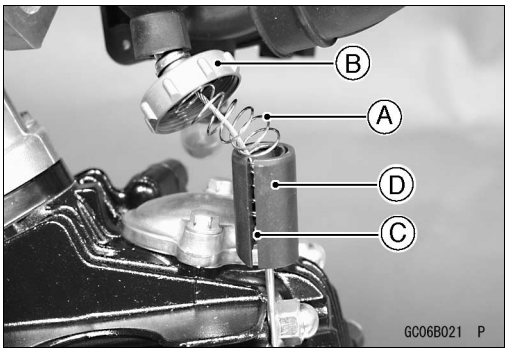
CAUTION

Do not use compressed air on an assembled carburetor, or the float may be deformed by the pressure.
Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution.
This will prevent damage to or deterioration of the parts.
Do not use a strong carburetor cleaning solution which could attack the plastic parts; instead, use a mild high flash-point cleaning solution safe for plastic parts.
Do not use wire or any other hard instrument to clean carburetor parts, especially jets, as they may be damaged.

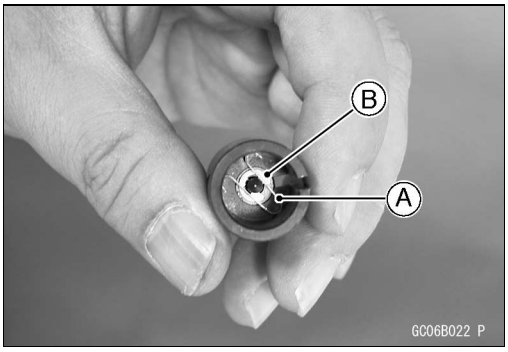
- Disassemble the carburetor.
- Immerse all the metal parts in a carburetor cleaning solution.
- Rinse the parts in water.
- When the parts are clean, dry them with compressed air.
- Blow through the air and fuel passages with compressed air.
- Assemble the carburetor.

Carburetor Disassembly

- Remove the carburetor.
- Pull the whole of spring [A] to the cap [B] side and hold it.
- Take out the cable lower end [C] from the throttle valve assembly [D].

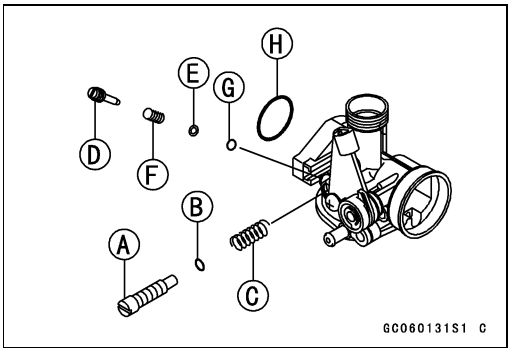


- Pull out the retainer [A], and jet needle with circlip [B].

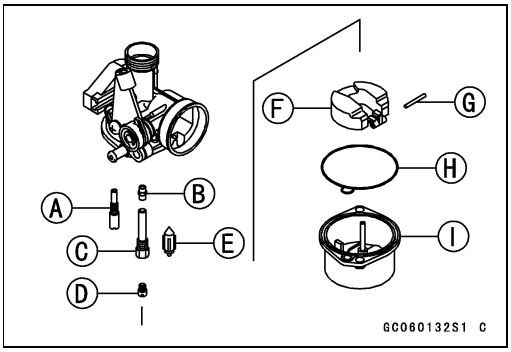


Carburetor

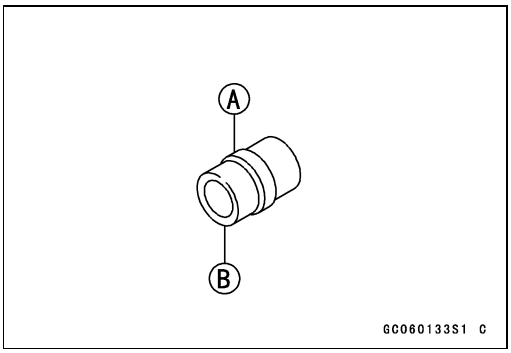
● Remove the following parts from the carburetor body.
Idle Adjusting Screw [A]
O-ring [B]
Spring [C]
Air Screw [D]
Washer [E]
Spring [F]
O-ring [G]
O-ring [H]



Pilot Jet [A]
Needle Jet [B]
Needle Jet Holder [C]
Main Jet [D]
Float Valve Needle [E]
Float [F]
Pin [G]
O-ring [H]
Float Bowl [I]



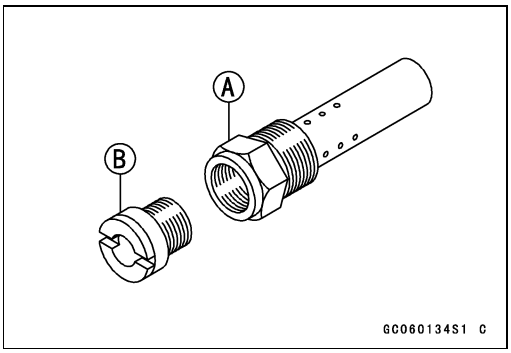
Carburetor Assembly
● Clean the disassembly parts before assembling.
● Clean the fuel and air passages with a high-flash-point solvent and compressed air.
● Install the needle jet [A] into the carburetor so that the smaller diameter end [B] of the jet goes in first.



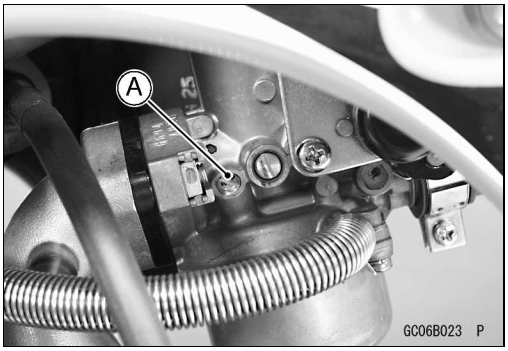
● Carefully screw in the needle jet holder. It will seat against the needle jet, pushing the end of the jet into the carburetor bore.

CAUTION

Do not force the needle jet holder [A] and main jet [B] or overtighten them. The needle jet or the carburetor body could be damaged requiring replacement.



● Turn in the air screw [A] fully but not tightly, and then back it out 1 1/4 turns.
● After installing the carburetor, do the following.
○ Check the fuel leakage.
○ Adjust the following items if necessary.
Throttle grip free play.
Idle speed.



Carburetor

Carburetor Inspection

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

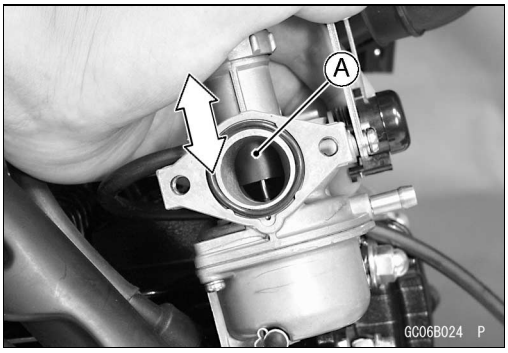
- Remove the carburetor.
- Before disassembling the carburetor, check the fuel level.

★If the fuel level is incorrect, inspect the rest of the carburetor before correcting it.

- Check that the throttle valve [A] moves smoothly and return back with the spring tension. The surface of the valve must not be excessively worn.

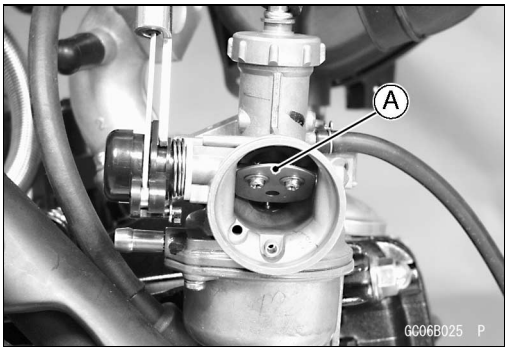
★If the throttle valve does not move smoothly, or if it is very loose in carburetor body. Replace the carburetor.

★If the spring tension is weak, replace it.



- Turn the starter cable bracket to check that the starter butterfly valve [A] move smoothly and return with spring tension.

★If the starter butterfly valve do not move smoothly, replace the carburetor.



NOTE

○ *Do not remove the air screw from the carburetor or change the air screw setting, or you will lose the best setting.*

- Disassemble the carburetor.
- Clean the carburetor.
- Check that the O-rings on the float bowl, drain plug and the intake pipe are in good condition.

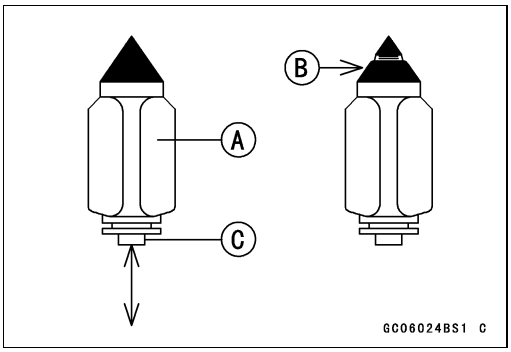
★If any of the O-rings are not in good condition, replace them.

- Remove the float valve needle.
- Check the float valve needle [A].

★If the needle is worn [B] as shown in the figure, replace the valve needle.

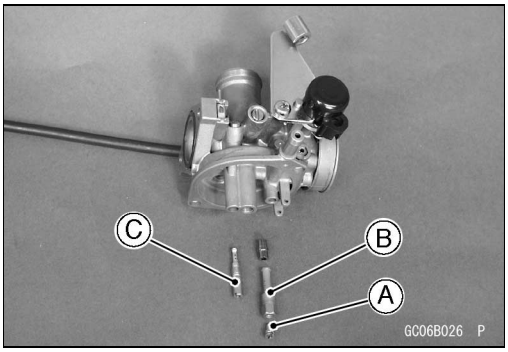
- Push the rod [C] in the valve needle, and then release it.

★If the rod does not spring out, replace the valve needle.



- Check the main jet [A], needle jet holder [B] and pilot jet [C] for any damage.

★If they are damaged, replace them with new ones.



Carburetor

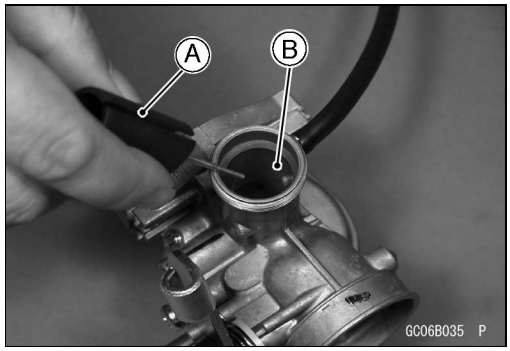
- Remove the throttle valve [A] and jet needle.
- Inspect the outside of the throttle valve for scratches and abnormal wear.

★If the valve is badly scratched or worn, replace it.

- Inspect the inside of the carburetor body for these same faults.

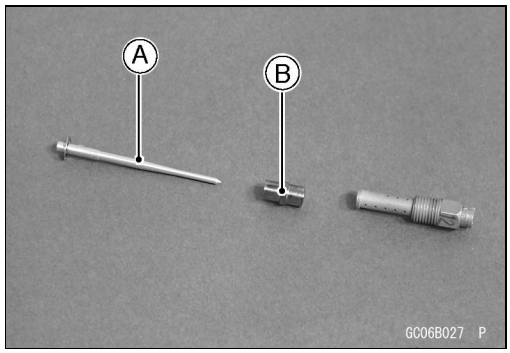
★If it is badly scratched or worn, replace the entire carburetor.

[B] Sliding Surface



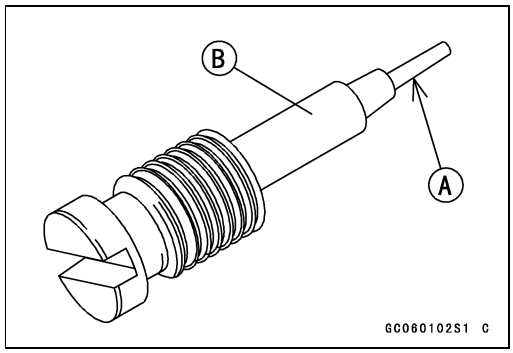
- Check the jet needle [A] and needle jet holder [B] for wear.

★A worn needle jet holder or jet needle should be replaced.



- Check the tapered portion [A] of the pilot screw [B] for wear or damage.

★If the pilot screw is worn or damaged on the tapered portion it will prevent the engine from idling smoothly. Replace it.



- Disassemble the carburetor, and clean the fuel, air passages with a high-flash-point solvent and compressed air.
- Stuff the lint-free, clean cloths into the air cleaner housing to keep dirt or other foreign material from entering.

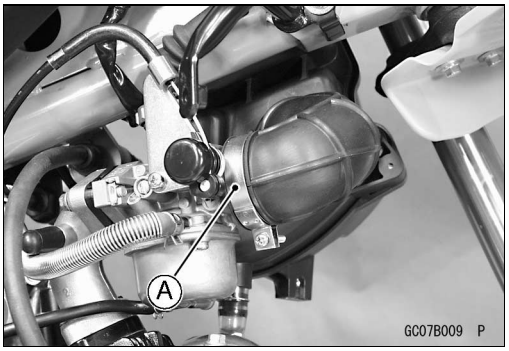
⚠WARNING

If dirt or dust is allowed to pass through into the carburetor, the throttle valve may become stuck, possibly causing an accident.

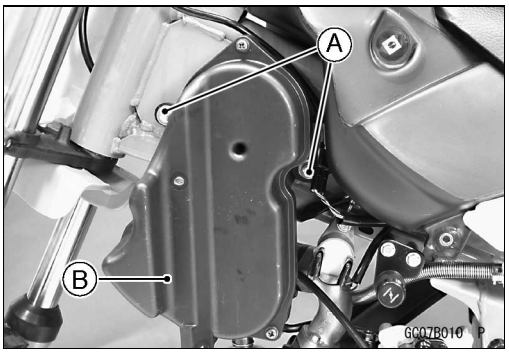
Air Cleaner

Air Cleaner Housing Removal

- Remove the left shroud.
- Loosen the air cleaner duct clamp [A].

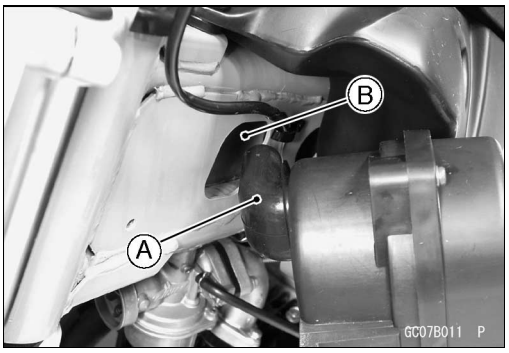


- Unscrew the air cleaner mounting bolts [A] and remove the air cleaner housing [B].



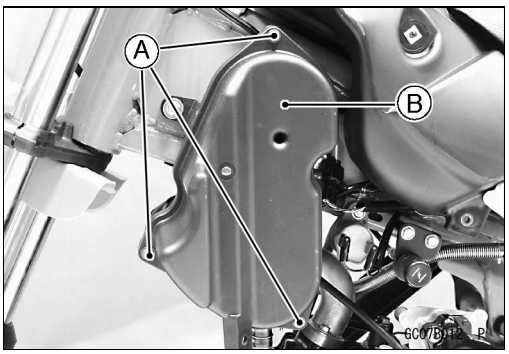
Air Cleaner Housing Installation

- Installation is the reverse of the removal.
- Install the intake portion [A] of air cleaner housing into the frame hole [B].

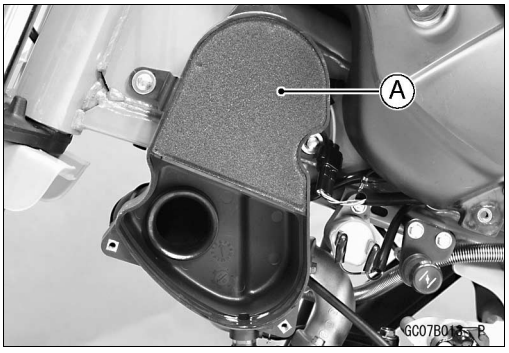


Element Removal

- Remove the left shroud.
- Unscrew the mounting screws [A] and remove the air cleaner housing cover [B].

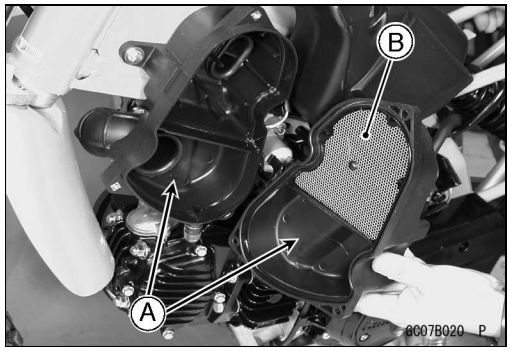


- Pull out the element [A].



Air Cleaner

- Stuff a clean, lint-free towel into the carburetor so no dirt is allowed to enter the carburetor.
- Wipe out the inside of the air cleaner housing [A] and the wire screen [B] with a clean damp towel.

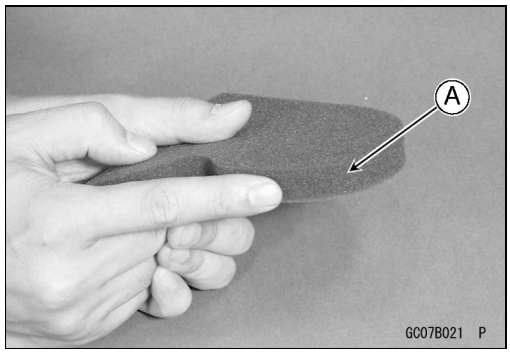


CAUTION

Check inside of the inlet tract and carburetor for dirt. If dirt is present, clean the intake tract and carburetor thoroughly. You may also need to replace the element and seal the housing and inlet tract.

Element Installation

- When installing the element, coat the lip of the element with a thick layer of all purpose grease [A] to assure a complete seal against the air cleaner element base. Also, coat the base and wire screen where the lip of the element fits.



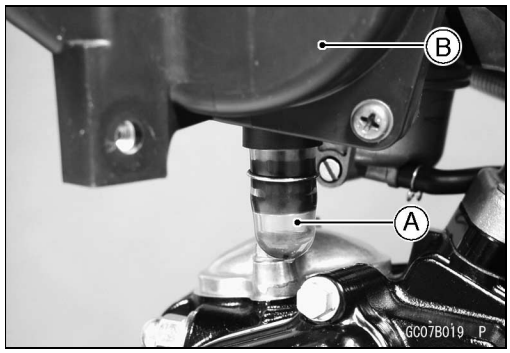
Element Cleaning and Inspection

○ Refer to Element Cleaning and Inspection in the Periodic Maintenance Chapter.

Oil Draining

- Inspect the transparent plug [A] under the air cleaner housing [B] to see if any oil has run down from the air cleaner housing.

★ If there is any oil in the plug, remove the plug and drain the oil.



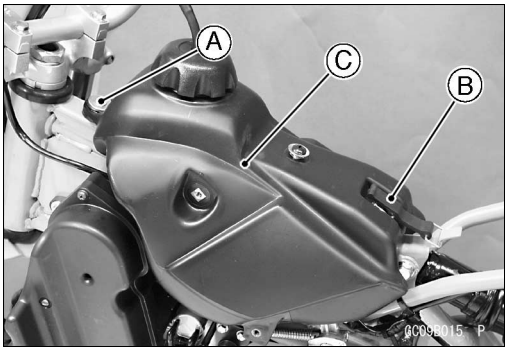
Fuel Tank

Fuel Tank Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Always stop the engine and do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Remove:
  Shrouds
  Seat
- Turn the fuel tap to the OFF position.
- Pull the fuel hose off the fuel tap.
- Remove the fuel tank mounting bolt [A] and band [B].
- Remove the fuel tank [C].
- Drain the fuel tank.



Fuel Tank Installation

- Check the rubber damper [A] on the frame.

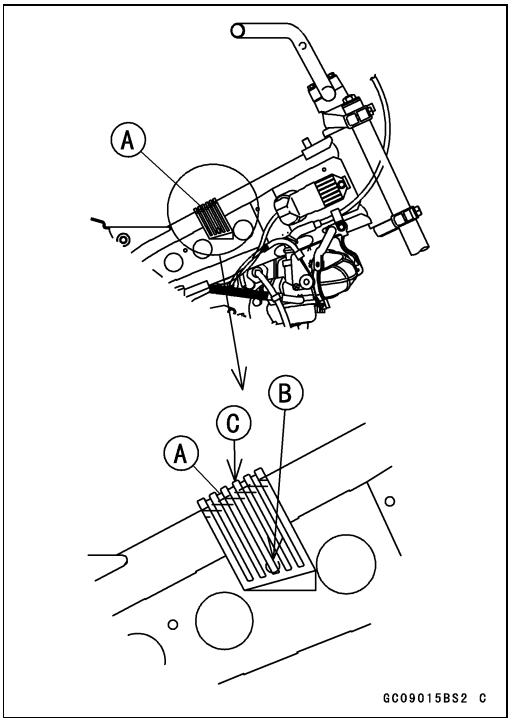
★If the damper is damaged or deteriorated, replace it.

- Install the rubber damper [A] noting its installing direction as shown.

○ Align the damper center with the frame hole [B].

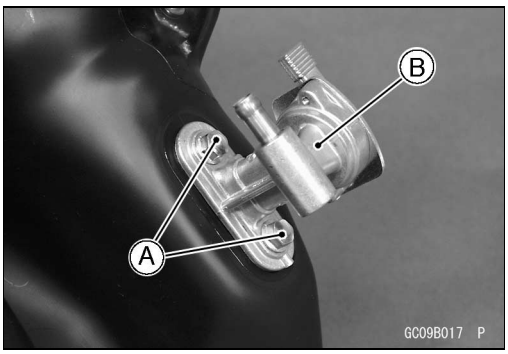
○ Apply adhesive to diagonal line portion [C].

- Be sure the fuel hose is clamped to the fuel tap to prevent leaks.
- Insert the fuel tank breather hose outlet end into the number plate hole.



Fuel Tap Removal

- Remove the fuel tank and drain it.
- Remove the mounting bolts [A] and take out the fuel tap [B].



Fuel Tank

Fuel Tap Installation

- Be sure the O-ring is in good condition to prevent leaks.
- Be sure to clamp the fuel hose to the tap to prevent leaks.

Fuel Tap Inspection

○ Refer to Fuel Tap Inspection in the Periodic Maintenance Chapter.

Fuel Tank and Tap Cleaning

⚠ WARNING

Clean the tank in a well-ventilated area, and take care that there is no sparks or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash-point solvent to clean the tank.

- Remove the fuel tank and drain it.
- Pour some high-flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Pour the solvent out of the tank.
- Remove the fuel tap from the tank by taking out the bolts.
- Clean the fuel tap filter screen in a high-flash-point solvent.
- Pour high flash-point solvent through the tap in all lever positions.
- Dry the tank and tap with compressed air.
- Install the tap in the tank.
- Install the fuel tank.

Engine Top End

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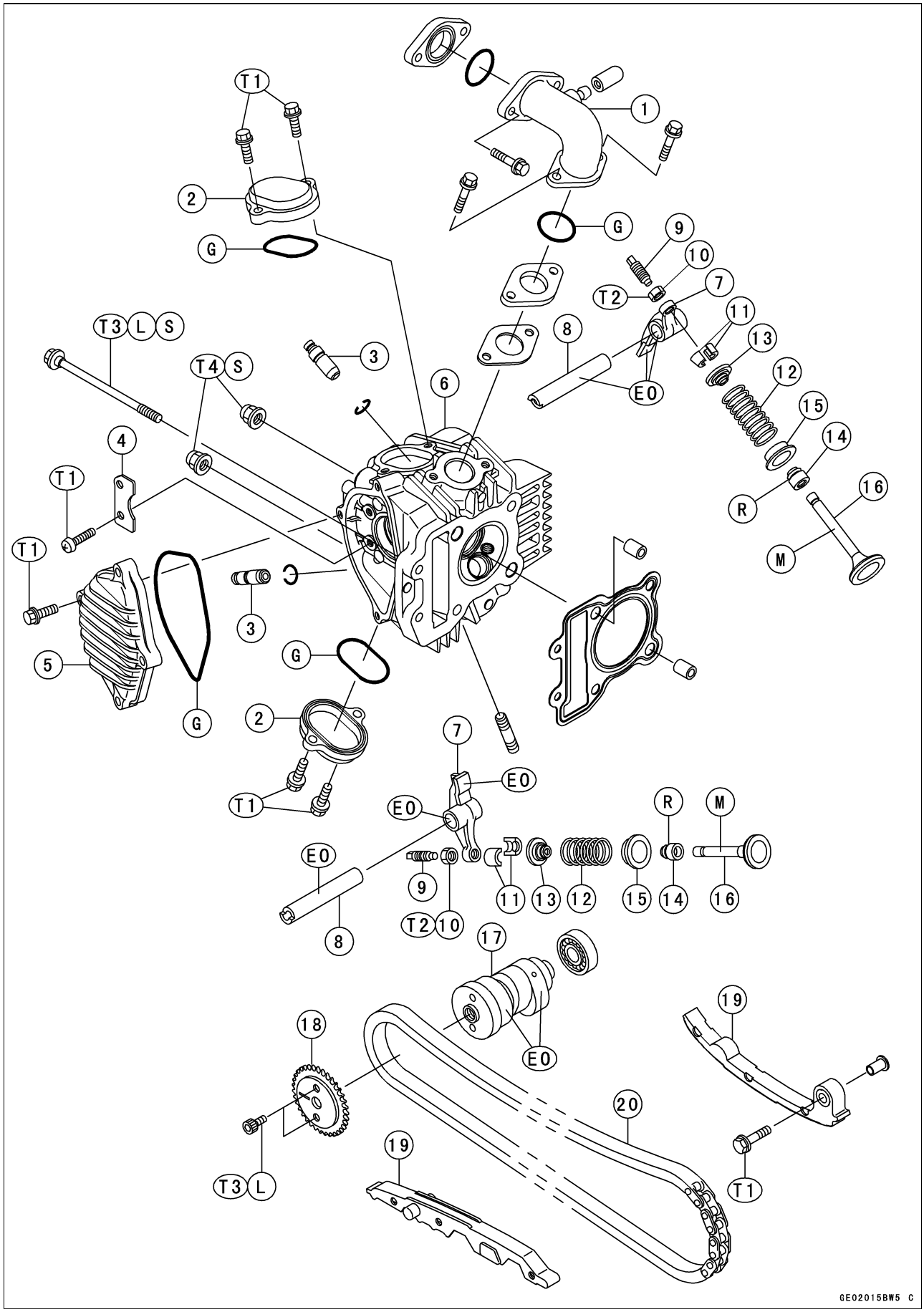
4-2 ENGINE TOP END

Exploded View

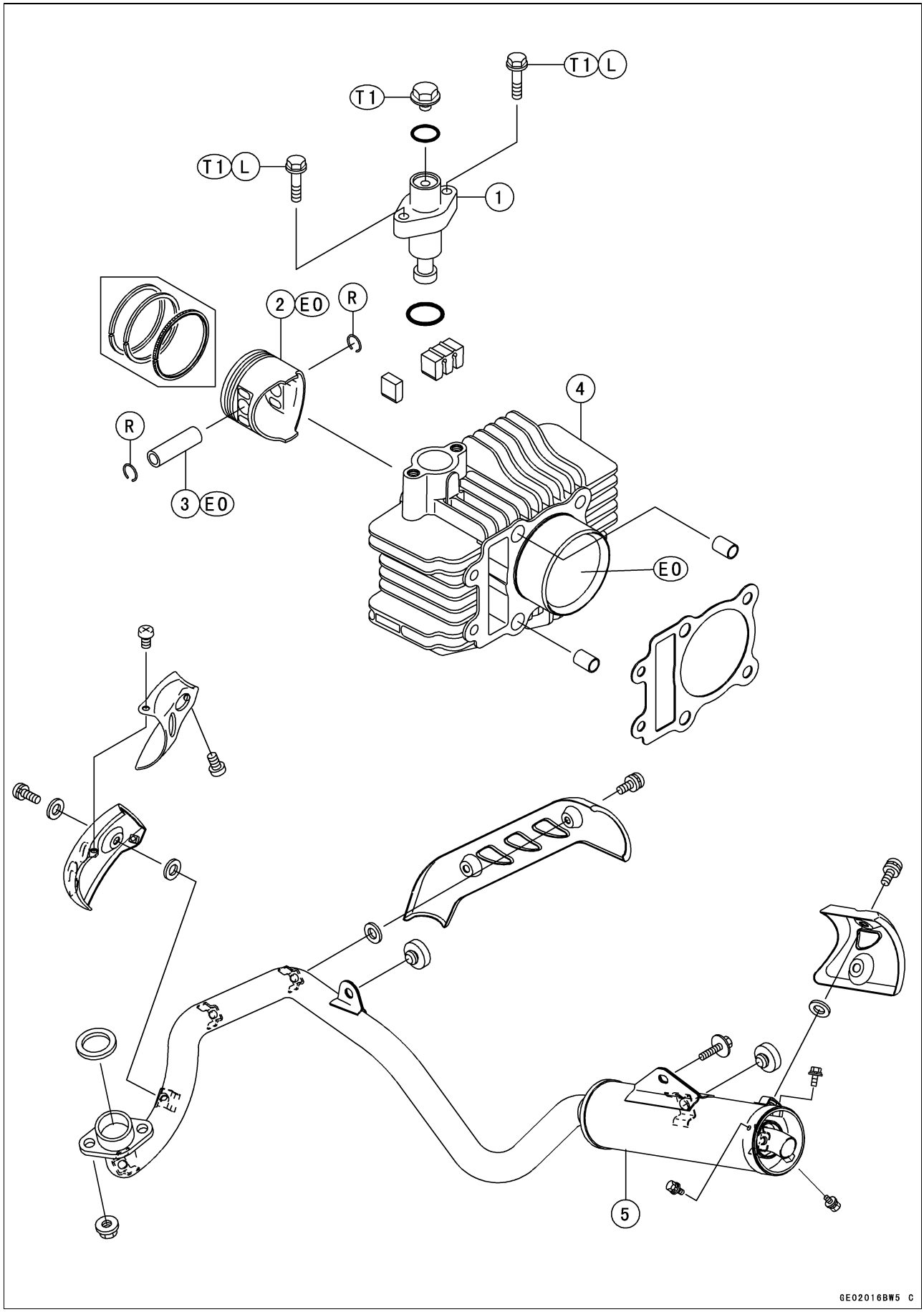


Exploded View

1. Intake Pipe
2. Valve Adjusting Cover
3. Valve Guide
4. Rocker Arm Shaft Stopper
5. Camshaft Sprocket Cover
6. Cylinder Head
7. Rocker Arm
8. Rocker Arm Shaft
9. Valve Adjusting Screw
10. Valve Adjusting Screw Locknut
11. Split Keepers
12. Valve Spring
13. Valve Spring Retainer
14. Stem Oil Seal
15. Valve Seat
16. Valve Stem
17. Camshaft
18. Camshaft Sprocket
19. Chain Guide
20. Camshaft Chain

S: Follow the specific tightening sequence.
EO: Apply engine oil.
M: Apply molybdenum disulfide grease.
R: Replacement parts
G: Apply grease.
L: Apply a non-permanent locking agent.
T1: 5.2 N·m (0.53 kgf·m, 46 in·lb)
T2: 8.8 N·m (0.9 kgf·m, 78 in·lb)
T3: 12 N·m (1.2 kgf·m, 8.9 ft·lb)
T4: 22 N·m (2.2 kgf·m, 16 ft·lb)

Exploded View



Exploded View

1. Camshaft Chain Tensioner
2. Piston
3. Piston Pin
4. Cylinder
5. Muffler

L: Apply non-permanent locking agent.
EO: Apply engine oil.
R: Replacement parts
T1: 5.2 N·m (0.53 kgf·m, 46 in·lb)

4-6 ENGINE TOP END

Specifications

Item		Standard	Service Limit
Camshaft:			
Camshaft:			
Cam height	Exhaust	29.021 mm ~ 29.201 mm	28.92 mm
	Inlet	28.984 mm ~ 29.164 mm	28.88 mm
Camshaft chain 20-link length		127.00 ~ 127.48 mm	128.9 mm
Rocker Arms, Shaft			
Rocker arm inside diameter		10.000 ~ 10.015 mm	10.05 mm
Rocker arm shaft diameter		9.980 ~ 9.995 mm	9.95 mm
Cylinder Head:			
Cylinder Compression			
		Usable range	
		865 ~ 1320 kPa (8.8 ~ 13.5 kgf/cm^2, 125 ~ 192 psi) @5 kicks	- - -
Cylinder head warp			0.05 mm
Valve:			
Valve Clearance:	Exhaust	0.04 ~ 0.08 mm	- - -
	Inlet	0.04 ~ 0.08 mm	- - -
Valve head thickness:			
	Exhaust	1.15 ~ 1.45 mm	0.5 mm
	Inlet	0.85 ~ 1.15 mm	0.5 mm
Valve stem bend		TIR 0.01 mm or less	TIR 0.05 mm
Valve stem diameter:			
	Exhaust	4.462 ~ 4.472 mm	4.44 mm
	Inlet	4.475 ~ 4.490 mm	4.46 mm
Valve guide inside diameter:			
	Exhaust	4.500 ~ 4.512 mm	4.55 mm
	Inlet	4.500 ~ 4.512 mm	4.55 mm
Valve/valve guide clearance:			
(wobble method):	Exhaust	0.06 ~ 0.11 mm	0.19 mm
	Inlet	0.02 ~ 0.07 mm	0.12 mm
Valve seat cutting angle		45°, 32°, 60°, 67.5°	
Valve seat surface:			
Width:	Exhaust	0.80 ~ 1.15 mm	- - -
	Inlet	0.80 ~ 1.15 mm	- - -
Outside diameter:	Exhaust	19.9 ~ 20.1 mm	- - -
	Inlet	22.9 ~ 23.1 mm	- - -
Valve spring free lengh:		36.75 mm	35.5 mm

Specifications

Item		Standard	Service Limit
Cylinder, Piston:			
Cylinder inside diameter		52.997 ∼ 53.009 mm	53.10 mm
Piston outside diameter		52.981 ∼ 52.993 mm	52.83 mm
Piston/cylinder clearance		0.010 ∼ 0.022 mm	- - -
Oversize piston and rings		+ 0.25 mm, +0.50 mm, 0.75 mm, and +1.0 mm	- - -
Piston ring/groove clearance:			
	Top	0.02 ∼ 0.06 mm	0.16 mm
	Second	0.01 ∼ 0.05 mm	0.15 mm
Piston ring groove width:			
	Top	0.81 ∼ 0.83 mm	0.90 mm
	Second	0.80 ∼ 0.82 mm	0.90 mm
Piston ring thickness:			
	Top	0.77 ∼ 0.79 mm	0.7 mm
	Second	0.77 ∼ 0.79 mm	0.7 mm
Piston ring end gap:			
	Top	0.15 ∼ 0.30 mm	0.6 mm
	Second	0.30 ∼ 0.45 mm	0.8 mm
	Oil	0.10 ∼ 0.60 mm	0.9 mm
Piston pin diameter		12.995 ∼ 13.000 mm	12.96 mm
Piston pin hole inside diameter		13.001 ∼ 13.007 mm	13.07 mm
Connecting rod small end inside diameter		13.003 ∼ 13.014 mm	13.05 mm

Special Tools - Compression Gauge: 57001–221
Piston Pin Puller Assembly : 57001–910
Compression Gauge Adapter, M10 X 1.0 : 57001–1317
Valve Guide Arbor, ϕ5.5 : 57001–1021
Valve Guide Reamer, ϕ5.5 : 57001–1020
Valve Seat Cutter Holder, ϕ5.5 : 57001–1125
Valve Seat Cutter Holder Bar : 57001–1128
Valve Seat Cutter, 45° – ϕ27.5 : 57001–1114
Valve Seat Cutter, 32° – ϕ25 : 57001–1118
Valve Seat Cutter, 60° – ϕ30 : 57001–1123
Valve Seat Cutter, 32° – ϕ22 : 57001–1206
Valve Seat Cutter, 45° – ϕ22 : 57001–1205
Valve Seat Cutter, 67.5° – ϕ22 : 57001–1207
Valve Spring Compressor Assembly: 57001–241
Valve Spring Compressor Adapter, ϕ20: 57001–1154
Valve Adjusting Screw Holder: 57001–1217

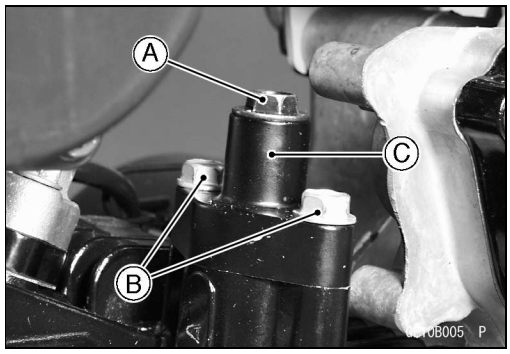
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

CAUTION

This is a non-return type cam chain tensioner. The push rod does not return to its original position once it moves out to take up cam chain slack. Observe all the rules listed below: When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Chain Tensioner Installation". Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damage the valves.

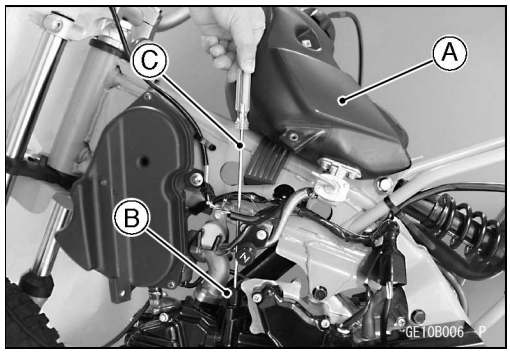
- Remove the left side cover.
- Loosen the cap bolt [A] before tensioner removal for later disassembly convenience.
- Unscrew the mounting bolts [B] and remove the camshaft chain tensioner [C].

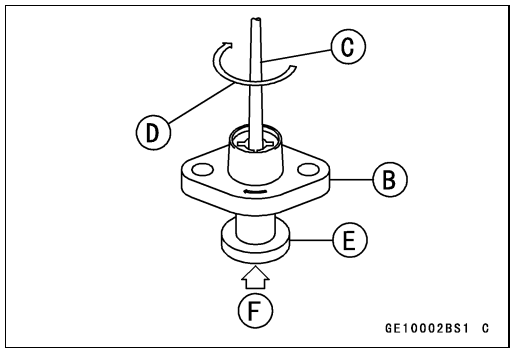


CAUTION

Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damaging the valves.

- Remove the fuel tank mounting bolt and band, and move the fuel tank [A] backward.
- Remove the camshaft chain tensioner [B] while the push rod [E] clockwise [D] and compressing [F] it with a suitable screwdriver [C].

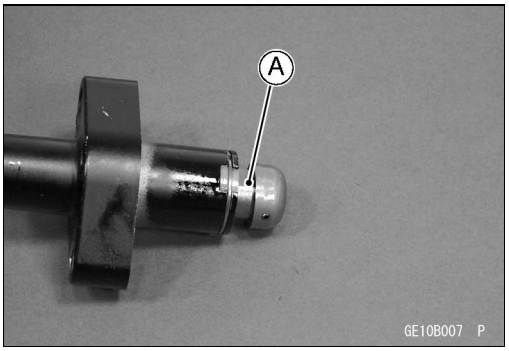




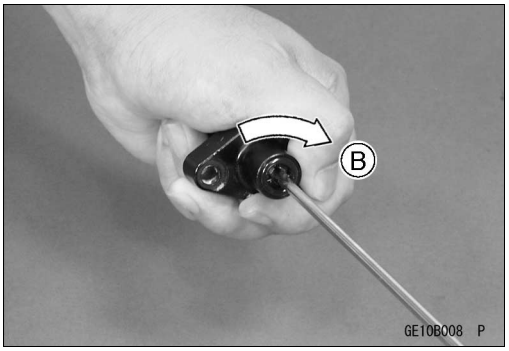
Camshaft Chain Tensioner

Camshaft Chain Tensioner Installation

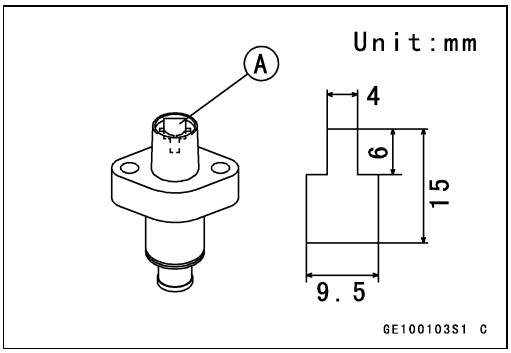
- Remove the tensioner cap bolt and O-ring.
- While compressing the push rod [A], turn it clockwise [B] with a suitable screwdriver until the rod protrusion comes to about 10 mm from the tensioner body.



CAUTION
Do not turn the rod counterclockwise at installation. This could detach the rod and the tensioner cannot be reinstalled.



- While holding the rod in position with a suitable push rod holder plate [A] install the tensioner on the cylinder block.



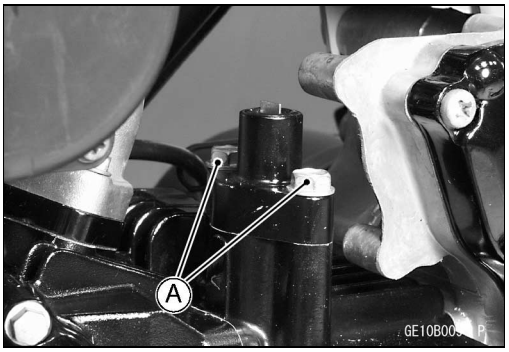
- Tighten the mounting bolts [A].

  Torque - Chain Tensioner Mounting Bolts: 5.2 N·m (0.53 kgf·m, 46 in·lb)

- Take out the holder plate.
- Install the O-ring and tighten the cap bolt.

  Torque - Tensioner Cap Bolt: 5.2 N·m (0.53 kgf·m, 46 in·lb)

- Install the left side cover.



Camshaft Chain Tensioner

Replacement Chain Tensioner Installation

○ A replacement chain tensioner (spare parts) has a push rod holder plate.

● Install the tensioner on the cylinder block, and tighten the mounting bolts.

Torque - Chain Tensioner Mounting Bolts: 5.2 N·m (0.53 kgf·m, 46 in·lb)

● Remove the plate to release the push rod.

● Install the O-ring and tighten the cap bolt.

Torque - Tensioner Cap Bolt: 5.2 N·m (0.53 kgf·m, 46 in·lb)

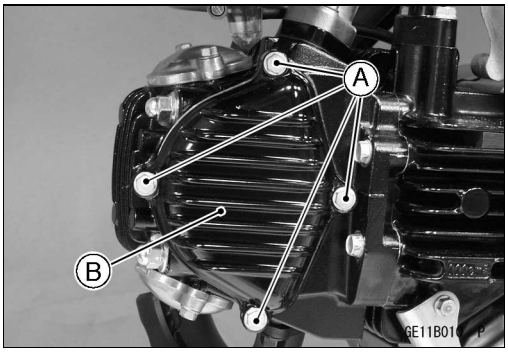
CAUTION
Do not pull the rod holder plate while the tensioner is removed. This could detach the rod and the tensioner cannot be installed easily.

Camshaft Sprocket

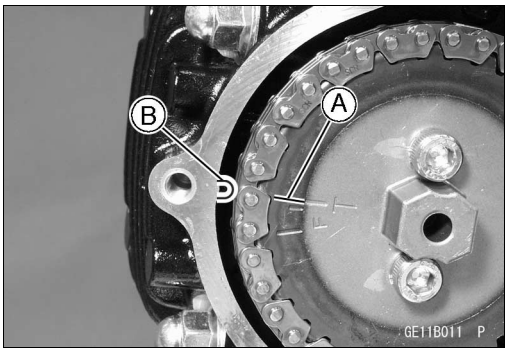
Camshaft Sprocket Removal

- Remove:
  Left Shroud
  Engine Sprocket Cover (see Final Drive chapter)
  Magneto Cover (see Electrical System chapter)

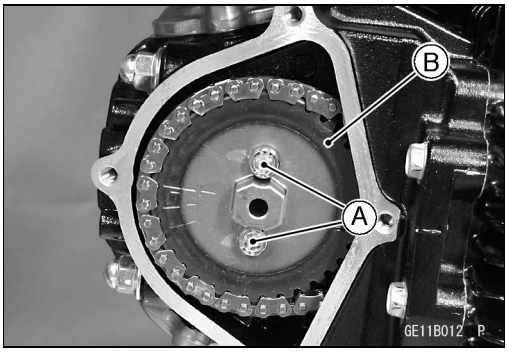
- Remove the camshaft sprocket cover bolts [A] and take off the cover [B].



- Turn the crankshaft counterclockwise until the line adjoining the line mark on the camshaft sprocket [A] aligns of the sprocket cover mating surface projection [B].
- Remove the camshaft chain tensioner.



- With a wrench on the magneto flywheel bolt to keep the crankshaft from turning, remove the camshaft sprocket bolts [A].
- Remove camshaft sprocket [B].



- Using a screwdriver [A] or wire to keep the chain [B] from falling down into the cylinder clock.

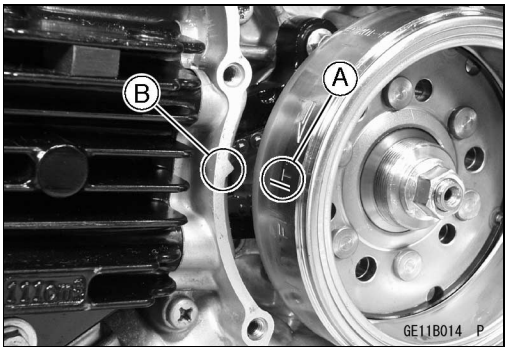
CAUTION

Always pull the camshaft chain taut while turning the crankshaft when the camshaft chain is loose.
This avoids kinking the chain on the lower (crankshaft) sprocket. A kicked chain could damage both the chain and the sprocket.

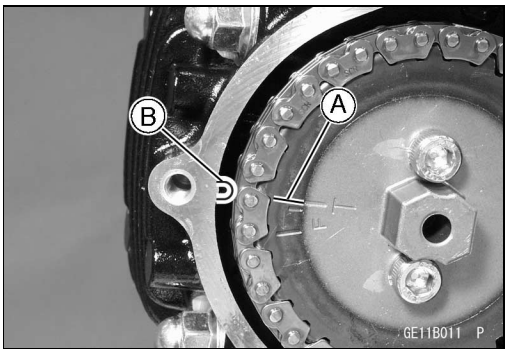
Camshaft Sprocket

Camshaft Sprocket Installation

- Check crankshaft position to see that the "T" mark [A] on the magneto flywheel aligns with the index mark [B] on the crankcase.
- Remember to pull the camshaft chain taut before rotating the crankshaft.

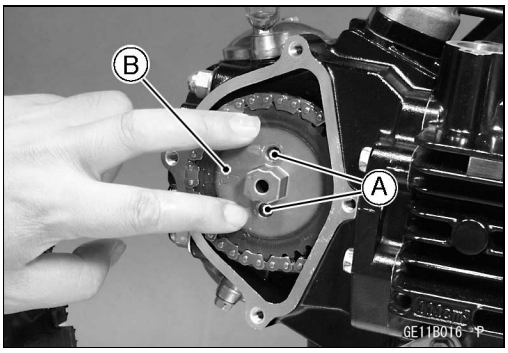


- Pull the lower side of the chain taut and fit it onto the sprocket so that the line [A] on the sprocket aligns with the make on the sprocket cover mating surface projection [B].



- Fit the sprocket up into place.
- ○ Turn the camshaft so that the cam lobes point downward, while holding the sprocket steady to align the bolt holes [A].
- Install the sprocket [B].
- Apply a non-permanent locking agent to the camshaft sprocket bolts.
- Keep the crankshaft from turning by holding a wrench on the magneto flywheel bolt.
- Tighten the sprocket bolts.

Torque - Camshaft Sprocket Bolts: 12 N·m (1.2 kgf·m, 8.9 ft·b)



- Install the camshaft chain tensioner.
- Check the camshaft chain timing.
- ○ Turn the crankshaft two turns in the counterclockwise, the crankshaft is at TDC, and re-check the camshaft chain timing.

★ If the timing mark is aligned, the camshaft chain timing is correct.

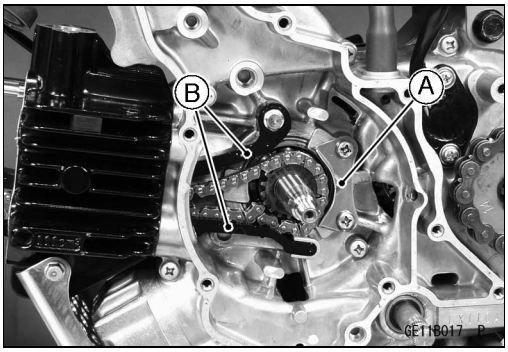
CAUTION

Rotation of the crankshaft with improper camshaft timing could cause the valve to contact each other or the piston, and bend.
If any resistance is felt when turning the crankshaft, stop immediately, and check the camshaft chain timing.

Camshaft Sprocket

Camshaft Chain Removal

- Drain the engine oil.
- Remove:
  Left Shroud
  Camshaft Chain Tensioner
  Camshaft Sprocket
  Cylinder Head
  Magneto Cover (see Electrical System chapter)
  Magneto Flywheel (see Electrical System chapter)
  Woodruff Key (see Electrical System chapter)
- Remove the camshaft chain holder [A] and chain guides [B].
- Take off the camshaft chain.

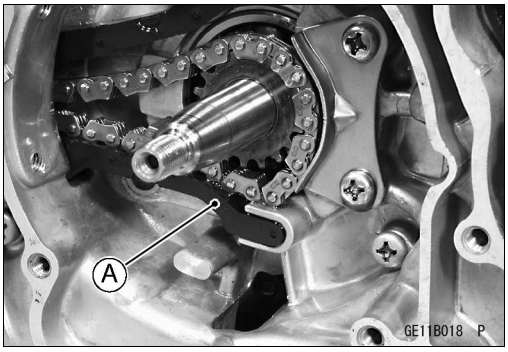


Camshaft Chain Installation

- Check to see that the crankshaft position is it TDC and re-adjust if necessary.
- Install the camshaft chain to the crankshaft and it is pulled up to the camshaft sprocket pass through camshaft chain hole in the cylinder.
- Keep the chain.
- Install the upper chain guide and camshaft chain holder.

Torque - Camshaft Chain Guide Bolt: 5.2 N·m (0.53 kgf·m, 46 in·lb)
Camshaft Chain Holder Bolts: 5.2N·m (0.53 kgf·m, 46 in·lb)

- Insert the lower chain guide [A] securely as shown.
- Install the other removed parts.



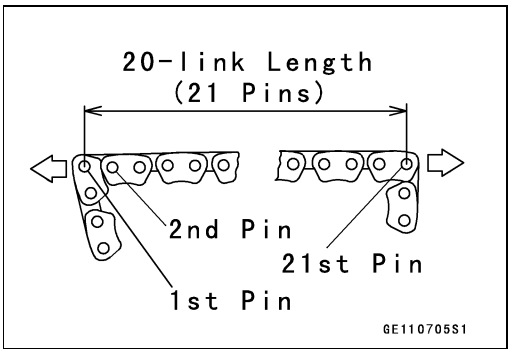
Camshaft Chain Wear

○ Hold the chain taut with a force of about 49 N (5 kg, 11 lb) in some manner and measure a 20-link length. Since the chain may wear unevenly, take measurement at several place.

Camshaft Chain 20 Link Length

Standard:	**127.00 ~ 127.48 mm**
Service Limit:	**128.9 mm**

★If the measurement of the camshaft chain exceeds the service limit, replace the chain.



Camshaft Chain Guide Wear

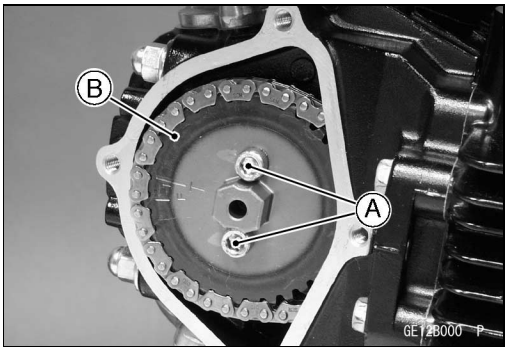
- Visually inspect the rubber on the guides.

★If the rubber is damaged or is missing places, replace the guide.

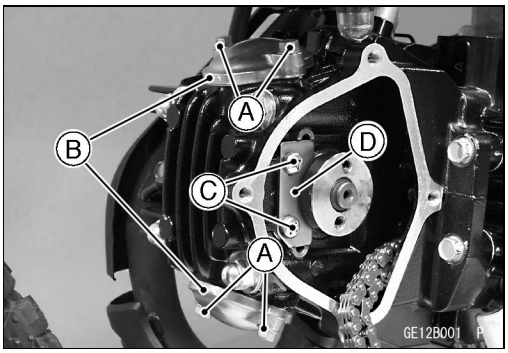
Rocker Arm, Rocker Arm Shaft

Rocker Arm Removal

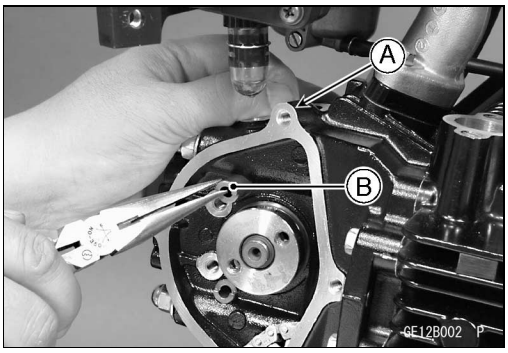
● Remove
Left Shroud
Camshaft Sprocket Cover
Camshaft Chain Tensioner
Camshaft Sprocket Bolts [A]
Camshaft Sprocket [B]



Valve Adjusting Cover Bolts [A]
Valve Adjusting Covers [B]
Rocker Arm Shaft Stopper Screws [C]
Rocker Arm Shaft Stopper [D]



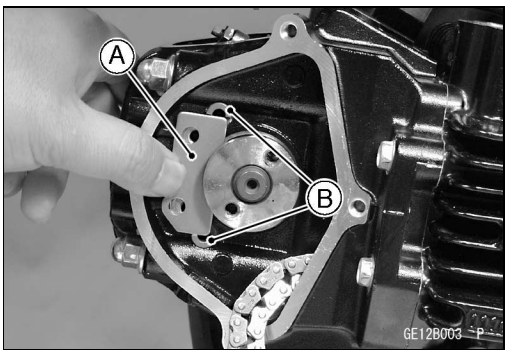
● While holding the rocker arm [A] with hand, pull out the rocker arm shaft [B] and take off the rocker arms.
○ Mark and record the rocker arm locations so that the rocker arm can be reinstalled in their original positions.



Rocker Arm Installation

● Clean the rocker arms and rocker arm shafts with a high-flash-point solvent.
● Apply a clean engine oil to the rocker arm shaft outside and rocker arm cam parts.
● Turn the camshaft so that the cam lobes point downward.
● Install the each rocker arm shaft, running it through each rocker arm.
● Install the rocker arm shaft stopper [A] so that the each rocker arm shaft protrusion [B] face to face.
● Tighten the rocker arm shaft stopper screws.

Torque - Rocker Arm Shaft Stopper Screws: 5.2 N·m (0.53 kgf·m, 46 in·lb)



● Install the camshaft sprocket.
○ Check and adjust the valve clearance.

CAUTION

When install the valve adjusting covers, be careful not to drop of protrude the O-rings from the cover grooves. If the O-ring is installed improperly, oil will leak.

Rocker Arm, Rocker Arm Shaft

Rocker Arm & Arm Shaft Wear

● Visually inspect where the cam and valve stem wear on each arm.

★If there is any damage or uneven wear, replace the arm.

○ Measure the inside diameter [A] of each rocker arm with a cylinder gauge.

Rocker Arm Inside Diameter

Standard:	**10.000 ∼ 10.015 mm**
Service Limit:	**10.05 mm**

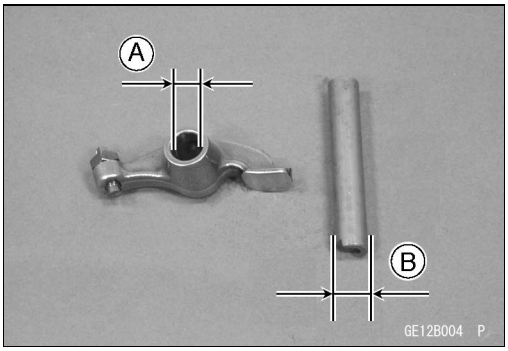
★If it exceeds the service limit, replace the arm.

○ Measure the diameter [B] of each rocker arm shaft where the rocker arm fits.

Rocker Arm Shaft Diameter

Standard:	**9.980 ∼ 9.995 mm**
Service Limit:	**9.95 mm**

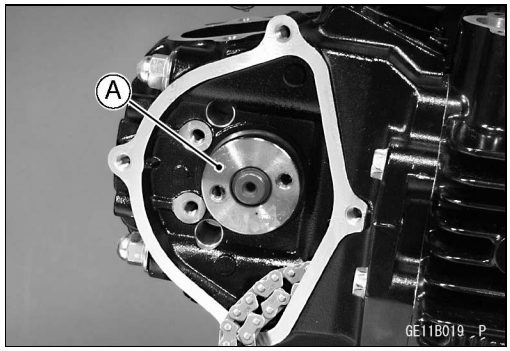
★If the diameter is less than the service limit, replace the rocker arm shaft.



Camshaft

Camshaft Removal

● Remove:
  Left Shroud
  Camshaft Chain Tensioner
  Camshaft Sprocket
  Rocker Arms
● Pull out the camshaft [A].



Camshaft Installation

● Clean the camshaft with a high-flash-point solvent.
● Apply clean engine oil to all cam parts.
● Install the camshaft in the cylinder head.
● Install the rocker arm.
● Install the other removed parts.
○ Check and adjust the valve clearance.

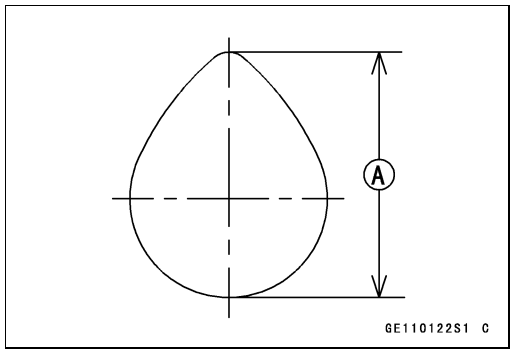
Camshaft Inspection

● Visually inspect the cam for wear or damage.
★ If there is any damage or wear, replace the camshaft.
● Measure the height [A] of each cam.

Cam Height

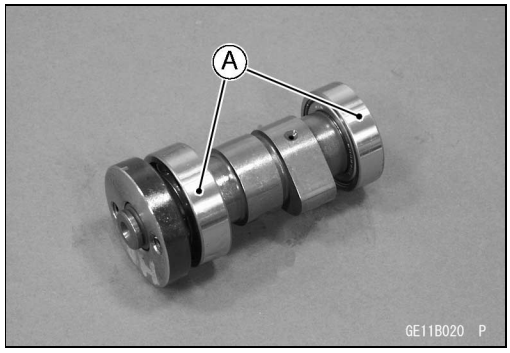
	Exhaust	Inlet
Standard:	**29.021 ∼ 29.201 mm**	**28.984 ∼ 29.164 mm**
Service Limit:	**28.92 mm**	**28.88 mm**

★ If any cam is worn down past service limit, replace the camshaft.



Camshaft Bearing Inspection

● Visually inspect each camshaft bearing [A].
★ If there is any damage replace the camshaft.
● Turn the bearing back and forth while checking for roughness or binding.
★ If roughness or binding is found, replace the camshaft.
★ If it is noisy, does not spin smoothly, or has any rough spots, replace the camshaft.



Cylinder Head

Compression Measurement

- Warm up the engine thoroughly
- Stop the engine.
- Remove the spark plug and attach compression gauge and adapter firmly into the spark plug hole.

Special Tools - Compression Gauge: 57001–221 [A]
Compression Gauge Adapter, M10X1.0: 57001–1317 [B]

- With the throttle fully open, turn the engine over sharply with the kick starter several times until the compression gauge stops rising; the compression is the highest reading obtainable.

Cylinder Compression
Usable Range: 865 ~ 1320 kPa
(8.8 ~ 13.5 kgf/cm^2, 125 ~ 192 psi) @5 kicks

The following table should be consulted if the obtainable compression reading is not within the usable range.

Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged position oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket, cylinder base gasket thickness.	Replace to gasket with a standard part.
Cylinder compression is lower than usable range	Gas leakage around cylinder head.	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating.	Repair if necessary.
	Incorrect valve clearance.	Adjust the valve clearance.
	Incorrect piston/cylinder clearance.	Replace the piston and/or cylinder
	Piston seizure.	Inspect the cylinder (and liner) and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves.	Replace the piston and/or the piston rings.

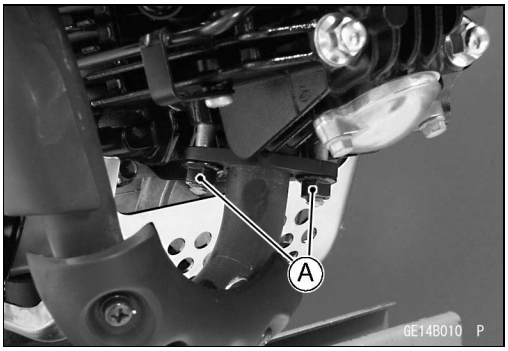
- Remove the compression gauge, adapter and install the spark plug.

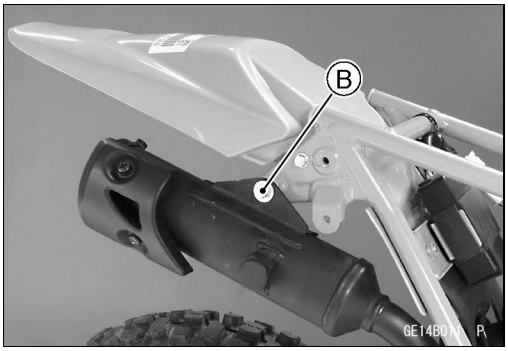
Torque - Spark Plug: 13 N·m (1.3 kgf·m, 9.6 ft·lb)

Cylinder Head

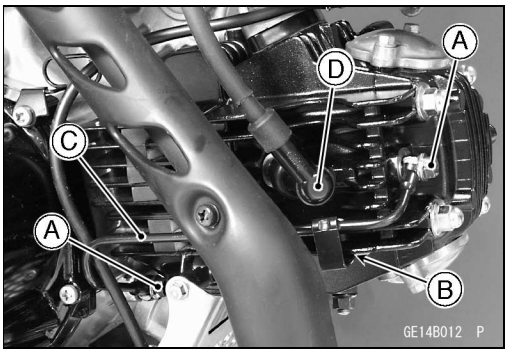
Cylinder Head Removal

- Remove the right and left shrouds.
- Remove the exhaust pipe holder nuts [A], and muffler mounting bolt [B] and then the muffler with the exhaust pipe holder.

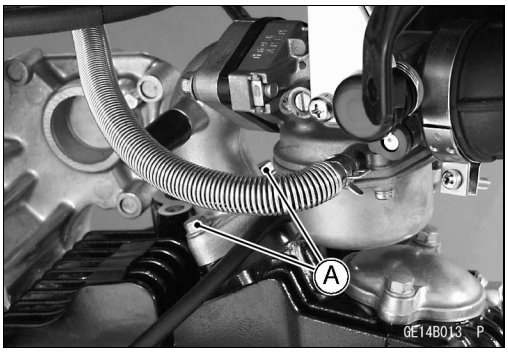




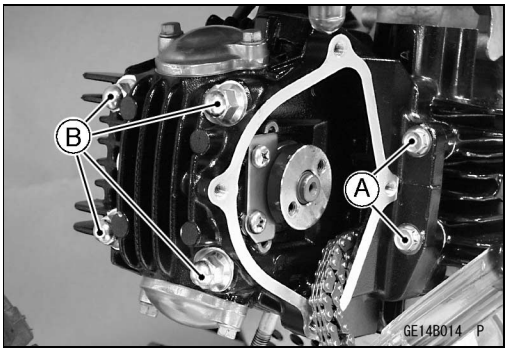
- Remove the oil pipe banjo bolts [A], screws [B], and take of the oil pipe [C].
- Remove the spark plug cap [D].



- Unscrew the intake pipe bolts [A].
- Remove:
  Camshaft Sprocket Cover
  Camshaft Chain Tensioner
  Camshaft Sprocket



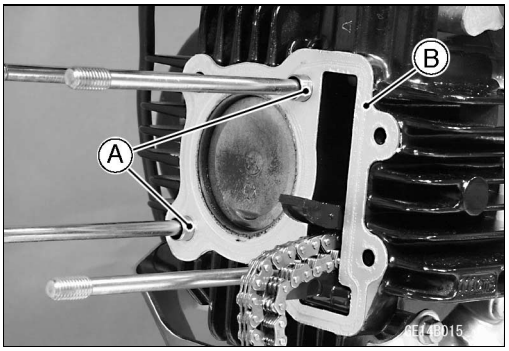
- Remove the cylinder head bolts [A], nuts [B], and take off the cylinder head.



Cylinder Head

Cylinder Head Installation

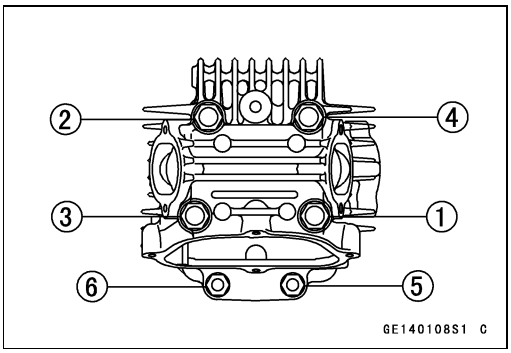
- Check to see that the two dowel pins [A] are in place on the cylinder.
- Install a new cylinder head gasket [B].



- Fit the cylinder head onto the cylinder block using a screwdriver or wire to keep the chain from falling down into the cylinder block.
- Apply a non-permanent locking agent to the cylinder head bolts.
- Tighten the cylinder head nuts and bolts following the tightening sequence as shown.

First Torque - Cylinder Head Bolts: 5.9 N·m (0.6 kgf·m, 52 in·lb)
Cylinder Head Nuts: 13 N·m (1.3 kgf·m, 9.6 ft·lb)

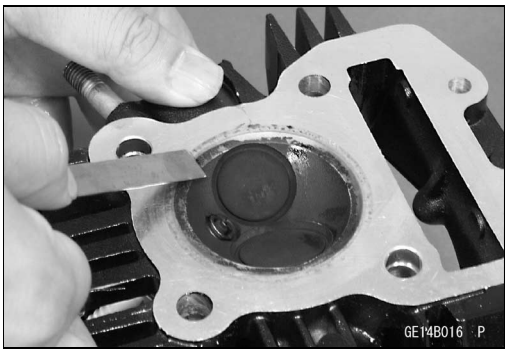
Final Torque - Cylinder Head Bolts: 12 N·m (1.2 kgf·m, 8.9 in·lb)
Cylinder Head Nuts: 22 N·m (2.2 kgf·m, 16 ft·lb)



- Install the camshaft sprocket.
- Install the other removed parts.

Cylinder Head Cleaning

- Scrape out any carbon, and wash the head with a high-flash-point solvent.

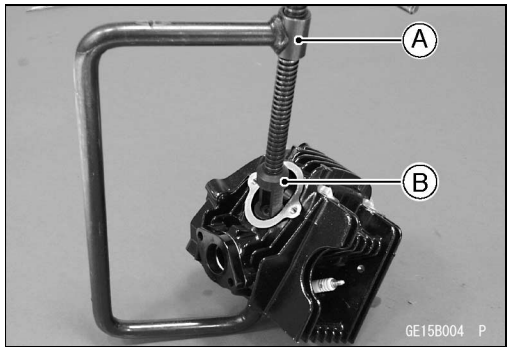


Valve/Valve Guide

Valve Removal

- Remove:
  Cylinder Head
  Rocker Arm & Rocker Arm Shaft
  Camshaft
- Using the valve spring compressor assembly to press down the valve spring retainer, remove the split keeper.

Special Tools - Valve Spring Compressor Assembly: 57001–241 [A]
Valve Spring Compressor Adapter, ϕ20: 57001–1154 [B]



- Remove the tool and then remove the spring retainer, spring, and spring seat.
- Push out the valve.
- Pull off the valve stem oil seal.

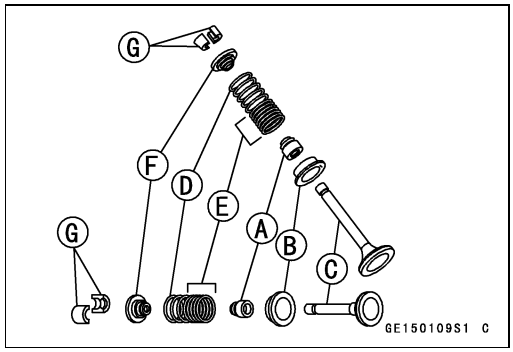
Valve Installation

- Replace the valve stem oil seal [A].
- Push a new valve stem oil seal into place.

★If a new valve is to be used, check the valve to guide clearance.
★If there is too much clearance, install a new valve guide.

- Check the valve seat [B].
- Apply a thin coat of molybdenum disulfide grease to the valve stem [C].
- Install spring [D] so that the closed coil end [E] faces downwards, white paint faces upward.
- Install the spring retainer [F] press it down with the valve spring compressor assembly, and put on the split keepers [G].
- After making sure that the split keepers and valve stem are all properly fitted, remove the tool.
- Install:
  Camshaft
  Rocker Arm & Arm Shaft
  Cylinder Head

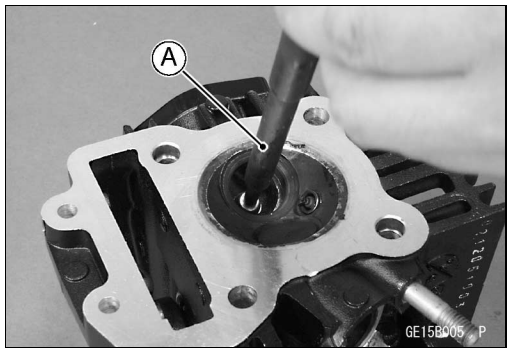
○ Check the valve clearance, and adjust if necessary.



Valve Guide Removal

- Remove:
  Cylinder Head
  Valve
  Valve Stem Oil Seal
- Heat the area around the guide to about 120° ~ 150°C (250° ~ 302°F) and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

Special Tool - Valve Guide Arbor, ϕ5.5: 57001–1021

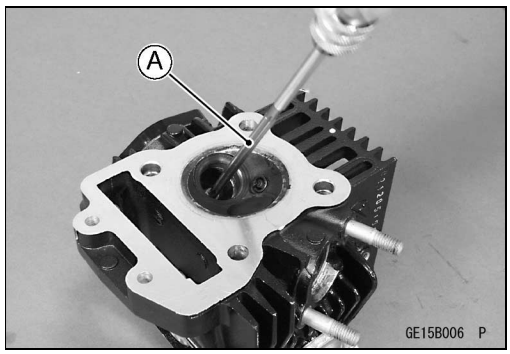


Valve Guide Installation

○ Valve guide are identical.

- Lightly oil the valve guide outer surface.
- Heat the cylinder head around the valve guide hole to about 120° ~ 150°C (250° ~ 302°F).
- Drive the valve guide in from the top of the cylinder head until the circlip stops the guide from going in too far.
- Allow the cylinder head to cool.
- Ream the valve guide with the valve guide reamer [A] even if the old guide is reused.

Special Tool - Valve Guide Reamer ϕ5.5: 57001–1020



Valve/Valve Guide

Valve Clearance Inspection

○ Refer to Valve Clearance Inspection in the Periodic Maintanance Chapter.

Valve Clearance Adjustment

○ Refer to Valve Clearance Adjustment in the Periodic Maintanance Chapter.

Valve Seat Inspection

● Remove the valve.
● Check the valve seat surface [A] between the valve [B] and valve seat [C].
○ Coat valve seat with machinists dye.
○ Push the valve into the guide.
○ Rotate the valve against the seat with a lapping tool.
○ Pull the valve out, and check the seating pattern on the valve head. It must be the correct width and even all the way around.
● Measure the outside diameter [D] of the seating pattern on the valve seat.
★ If the outside diameter is too large or too small, repair the seat (see Seat Repair).

Valve Seating Surface Outside Diameter

Standard:	**Inlet**	**22.9 ∼ 23.1 mm**
	Exhaust	**19.9 ∼ 20.1 mm**

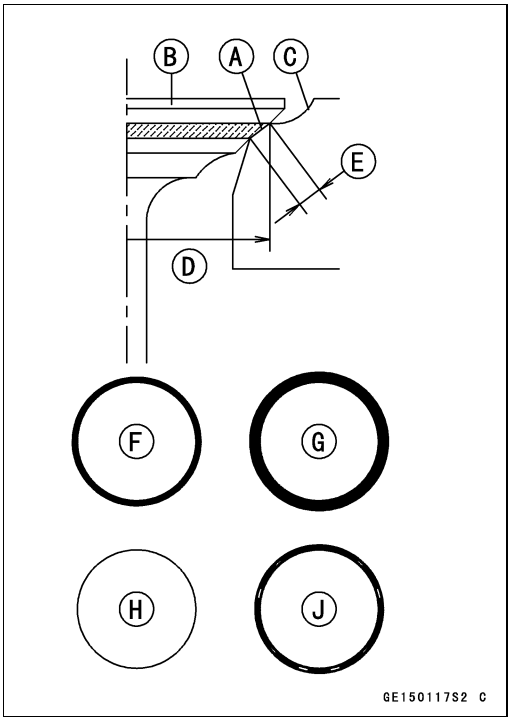
NOTE

○ *The valve stem and guide must be in good condition or this check will not be valid.*

★ If the valve seating pattern is not correct, repair the seat.
● Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.
Good [F]
★ If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Seat Repair).

Valve Seat Width

Standard:	**Inlet**	**0.80 ∼ 1.15 mm**
	Exhaust	**0.80 ∼ 1.15 mm**



Valve Seat Repair

● Repair the valve seat with the valve seat cutters.

Special Tools - Valve Seat Cutter Holder, φ5.5: 57001–1125
Valve Seat Cutter Holder Bar: 57001–1128

Inlet

Special Tools - Valve Seat Cutter, 45° – φ27.5: 57001–1114
Valve Seat Cutter, 32° – φ25: 57001–1118
Valve Seat Cutter, 60° – φ30: 57001–1123

Exhaust

Special Tools - Valve Seat Cutter, 32° – φ22: 57001–1206
Valve Seat Cutter, 45° – φ22: 57001–1205
Valve Seat Cutter, 67.5° – φ22: 57001–1207

★If the manufacturer's instructions are not available, use the following procedure.

Seat Cutter Operating Care:

1. This valve seat cutter is developed to grind the valve for repair. Therefore the cutter must not be used for other purpose than seat repair.
2. Do not drop or shock the valve seat cutter, or the diamond particles may fall off.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

NOTE

○ *Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.*

4. Setting the valve seat cutter holder in position, operate the cutter in one hand. Do not apply too much force to the diamond position.

NOTE

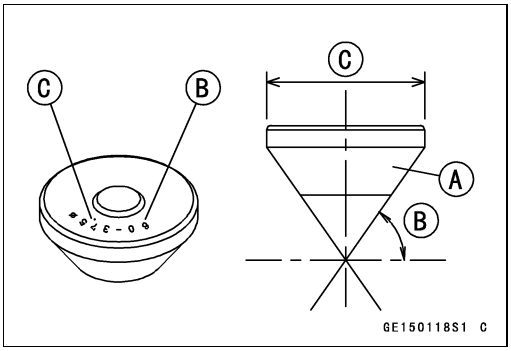
○ *Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.*

5. After use, wash the cutter with washing oil and apply a thin layer of engine oil before storing.

Marks Stamped on the cutter:

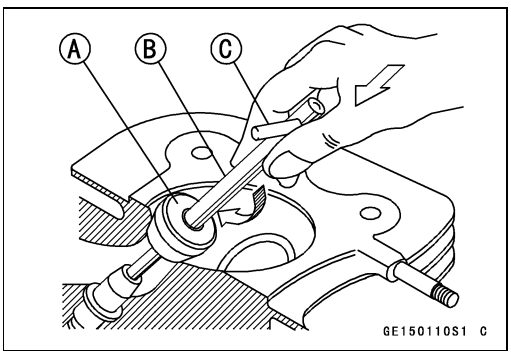
The marks stamped on the back of the cutter [A] represent the following.

60°..... Cutter angle [B]
30φ..... Outer diameter of cutter [C]



Operating Procedures:

● Clean the seat area carefully.
● Coat the seat with machinist's dye.
● Fit a 45° cutter [A] to the holder [B] and slide it into the valve guide.
● Press down lightly on the handle [C] and turn it right or left. Grind the seating surface only until it is smooth.



CAUTION

Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

Valve/Valve Guide

- Measure the outside diameter of the seating surface with a vernier calipers.

★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.

★If the outside diameter of the seating surface is too large, make the 32° grind described below.

★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.

- Grind the seat at a 32° angle until the seat O.D. is within the specified range.

○ To make the 32° grind, fit a 32° cutter to the holder, and slide it into the valve guide.

○ Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

CAUTION

The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

○ After making the 32° grind, return to the seat O.D. measurement step above.

- To measure the seat width, use a vernier calipers to measure the width of the 45° angle portion of the seat at several places around the seat.

★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too width, and then return to the seat O.D. measurement step above.

★If the seat width is too wide, make the 60° grind described below.

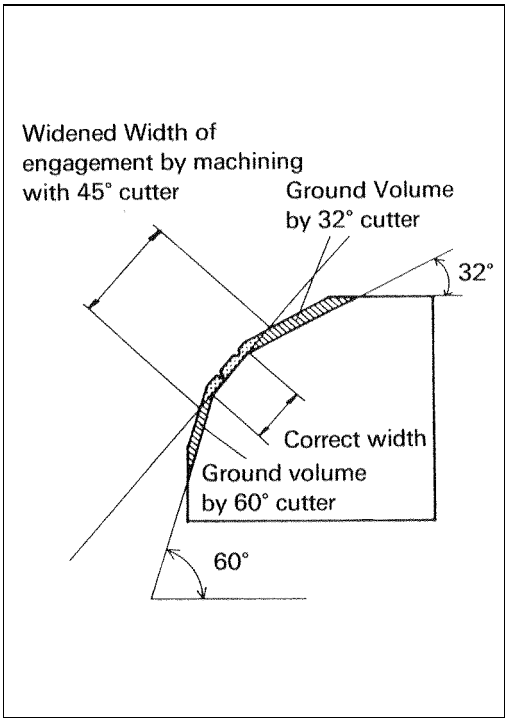
★If the seat width is within the specified range, lap the valve to the seat as described below.

- Grind the seat at a 60° angle until the seat width is within the specified range.

○ To make the 60° grind, fit 60° cutter to the holder, and slide it into the valve guide.

○ Turn the holder, while pressing down lightly.

○ After making the 60° grind, return to the seat width measurement step above.



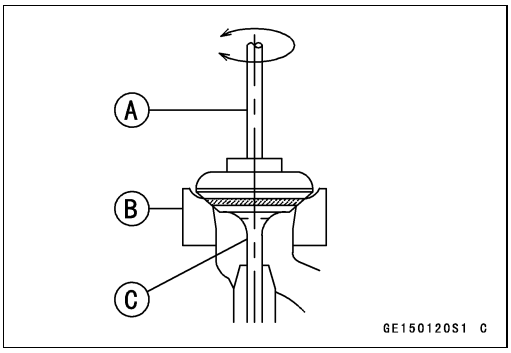
- Lap the valve to the seat using a lapper, once the seat width and O.D. are within the ranges specified above.

○ Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.

○ Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.

○ Repeat the process with fine grinding compound.

[A] Lapper
[B] Valve Seat
[C] Valve



- The seating area should be marked about in the middle of the valve face.

★If the seat area is incorrect place on the valve, be sure to check the valve is the correct part. If it is, it may have been refaced too much replace the valve.

- Be sure to remove all grinding compound before assembly.
- When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Adjustment).

Valve/Valve Guide

Valve Head Thickness Inspection

● Measure the thickness of valve head.

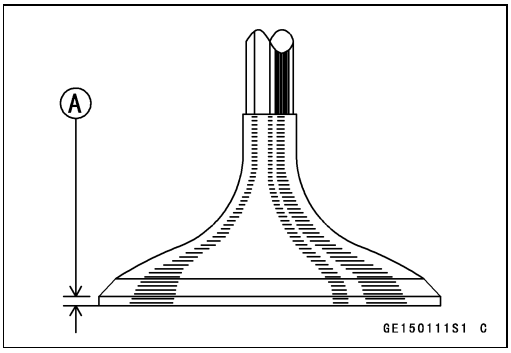
Valve Head Thickness [A]
Inlet valve:

Standard:	**0.85 ~ 1.15 mm**
Service Limit:	**0.5 mm**

Exhaust valve:

Standard:	**1.15 ~ 1.45 mm**
Service Limit:	**0.5 mm**

★If it is under the service limit, replace the valve.



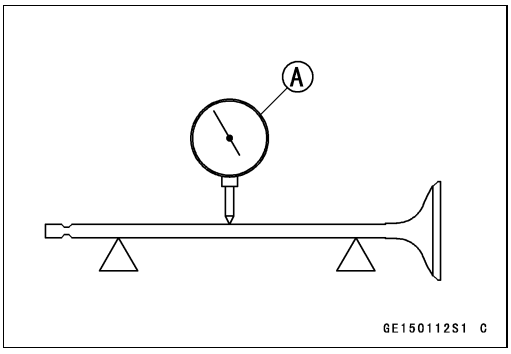
Valve Stem Bend Inspection

● Support the valve at both ends of the straight stem portion, and set a dial gauge against the center of the stem.
● Turn the valve and read the variation in the dial gauge [A].

Valve Stem Bend

Standard:	**TIR 0.01 mm or less**
Service Limit:	**TIR 0.05 mm**

★If it is bent over the service limit, replace the valve.



Valve Stem Diameter Inspection

● Measure the diameter of the valve stem.

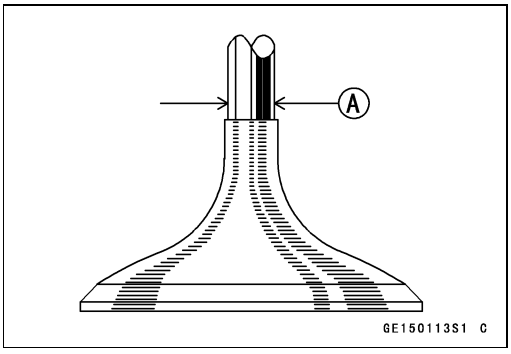
Valve Stem Diameter [A]
Inlet valve:

Standard:	**4.475 ~ 4.490 mm**
Service Limit:	**4.46 mm**

Exhaust valve:

Standard:	**4.462 ~ 4.472 mm**
Service Limit:	**4.44 mm**

★Replace the valve if the stem is worn to less than the service limit.



Valve Guide Inside Diameter Inspection

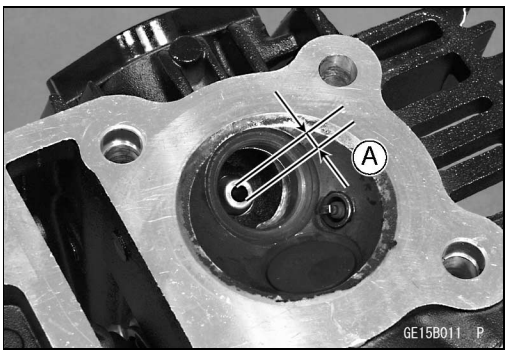
If a small bore gauge and micrometer are available, measure the valve guide as follows.

● Measure the inside diameter [A] of the valve guide. Since the guide wears unevenly, measure the diameter at four place up and down the guide.

Valve Guide Inside Diameter (Inlet and Exhaust)

Standard:	**4.500 ~ 4.512 mm**
Service Limit:	**4.55 mm**

★If any measurement exceeds the service limit, replace the valve guide.

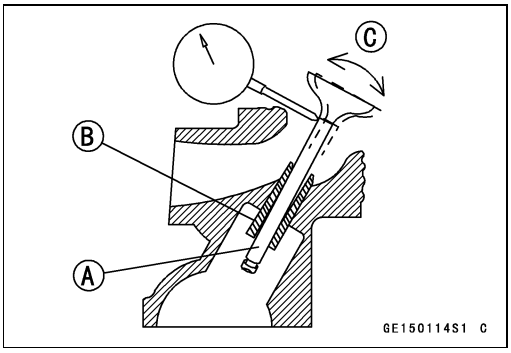


Valve/Valve Guide

Valve to Guide Clearance Measurement

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the valve guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure valve/valve guide clearance.



Valve/Valve Guide Clearance (Woble Method)

	Standard	Service Limit
Exhaust	**0.06 ∼ 0.11 mm**	**0.19 mm**
Inlet	**0.02 ∼ 0.07 mm**	**0.12 mm**

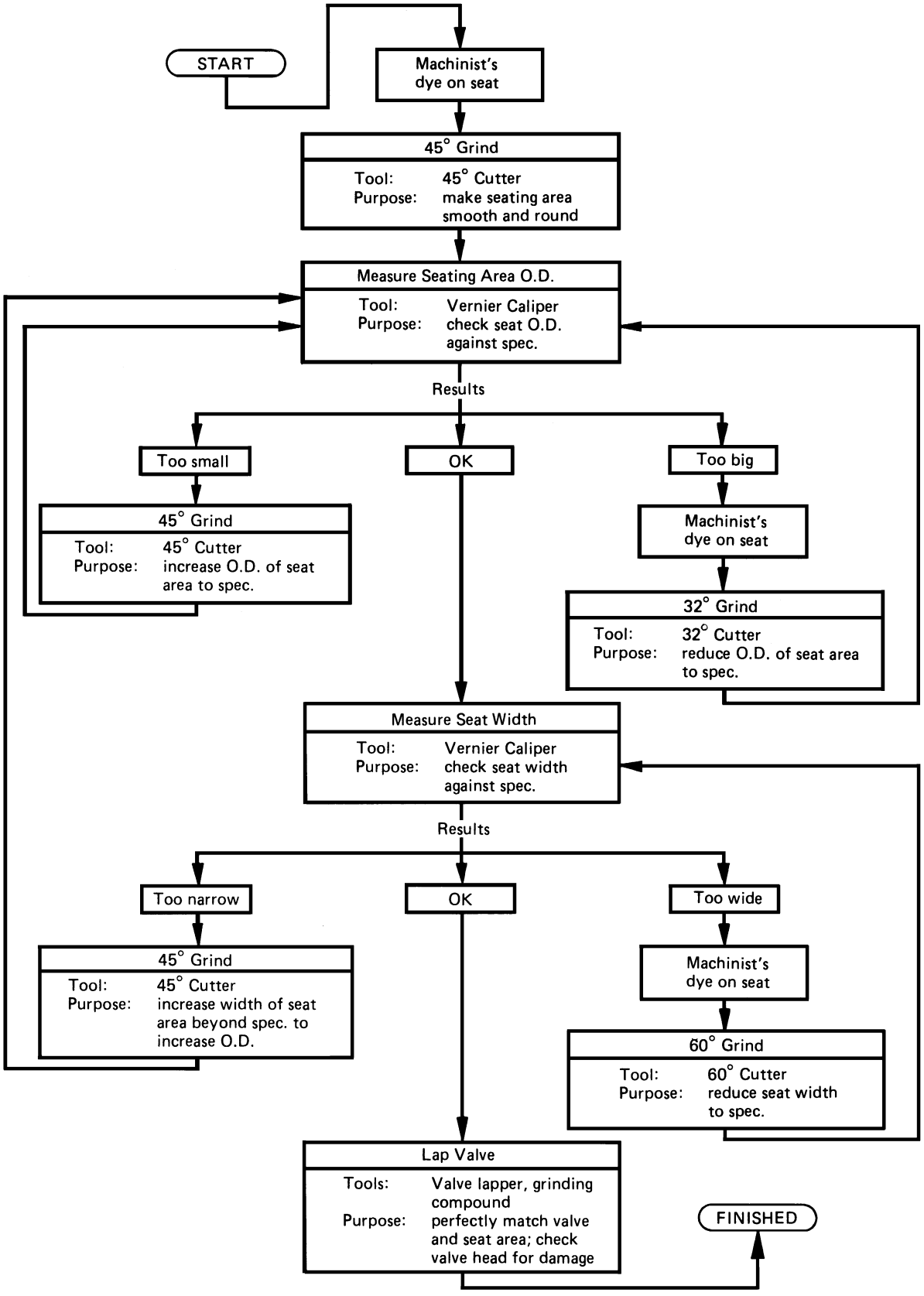
- Repeat the measurement in a direction at a right angle to the first.

★If the reading exceeds the service limit, replace the guide.

NOTE

○ *The reading is not actual valve/valve guide clearance because the measuring point is above the guide.*

Valve Seat Repair



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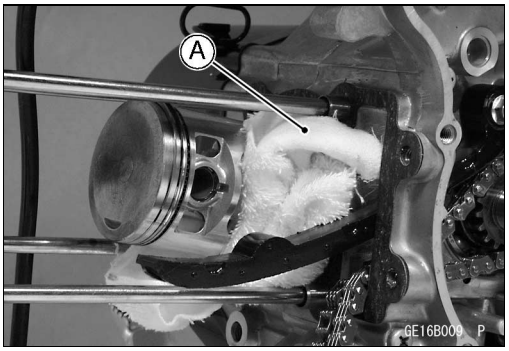
Cylinder, Piston

Cylinder Removal

- Removed the cylinder head.
- Take out the cylinder block with lower camshaft chain guide, and remove the gasket. There are knock pins on the cylinder base.
- Wrap a clean cloth [A] around the base of the piston so that no parts or dirt will fall into the crankcase.

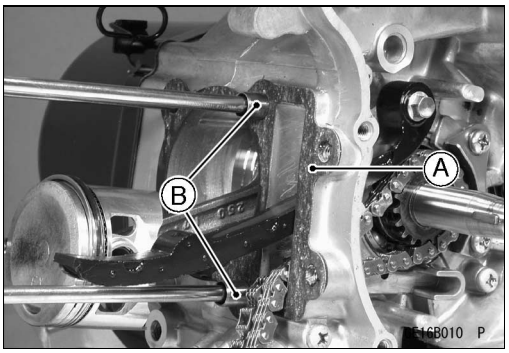


Cylinder Installation

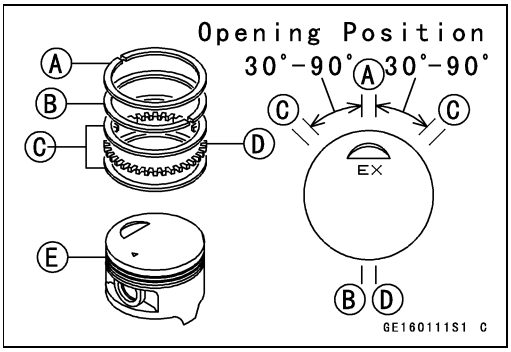
NOTE

○ *If the cylinder block is replaced with a new one, piston to cylinder clearance must be checked against the specified value.*

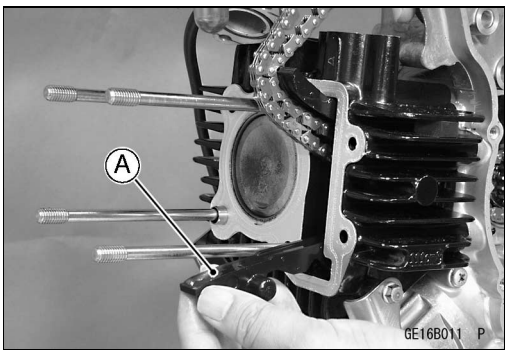
- Install a new cylinder base gasket [A] and be sure that two knock pins [B] are properly fitted in the crankcase.



- Pull the camshaft chain taut top avoid kicking it and use a wrench on the crankshaft to set the piston at BDC.
- Position the piston ring opening as follows.
  Top Ring – Front [A]
  Second Ring – Rear [B]
  Upper Steel Rail – About 30° ~ 90° of angle to the right [C]
  Expander – Rear [D]
  Lower Steel Rail – About 30° ~ 90° of angle to the left [C]
  Piston [E]

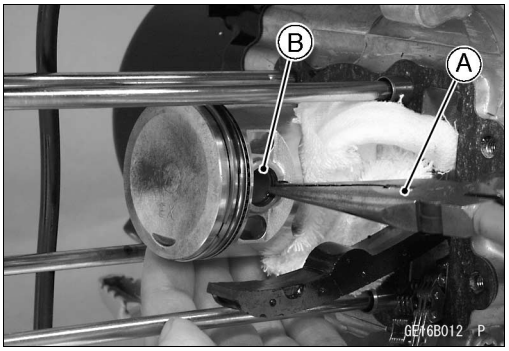


- Apply engine oil to the piston rings and the cylinder inside surface.
- Pull the camshaft chain up through the cylinder and insert a screwdriver to keep the chain from falling back into the engine.
- Place the upper camshaft chain guide inside the cylinder blocks.
- Fit the bottom of the cylinder over the piston rings, pressing in on opposite sides of the rings as necessary. Take care that the rings do not slip out of their proper positions.
- Insert the lower camshaft chain guide [A] all the way down.
- Install the cylinder head.



Piston Removal

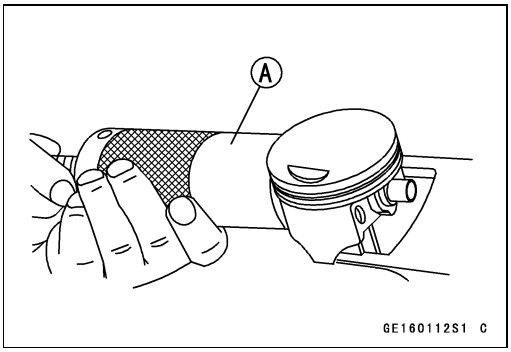
- Remove the cylinder.
- Remove:
  Pliers [A]
  Snap Ring [B]



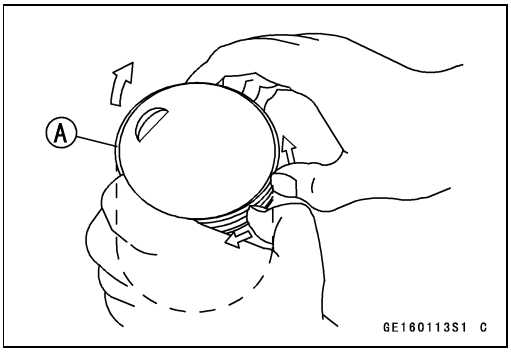
Cylinder, Piston

● Remove the piston by pushing its pin pull out the side that the snap ring was removed. Use the piston pin puller assembly [A] if the pin is tight.

Special Tools - Piston Pin Puller Assembly: 57001–910



● Remove the piston rings [A]. Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring to remove it.



Piston Installation

NOTE

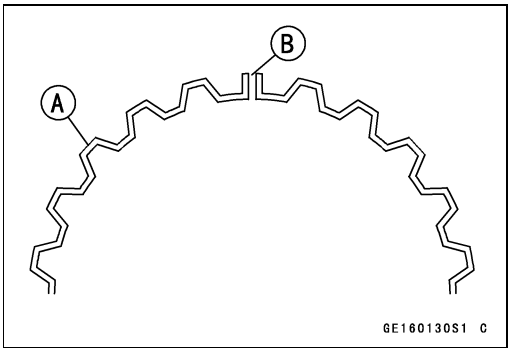
○ *The oil ring rails have no "top" or "bottom".*

● Install the oil ring expander [A] in the bottom piston ring groove so that the ends [B] but together, never overlap.

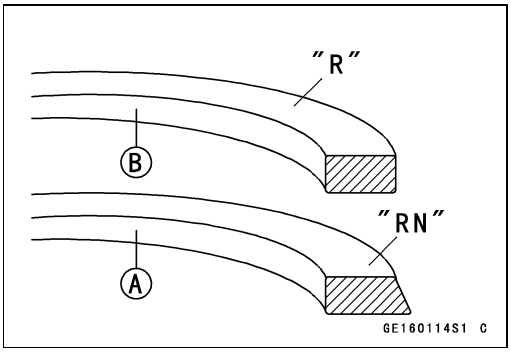
● Install the oil ring steel rails, one above the expander and one below it.

○ Spread the rail with your thumbs, but only enough to fit the rail over the piston.

○ Release the rail into the bottom piston ring groove.



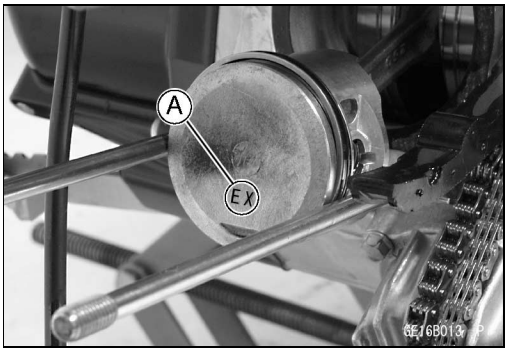
● With the marked side facing up, install the second ring [A] and top ring [B] in that order.



NOTE

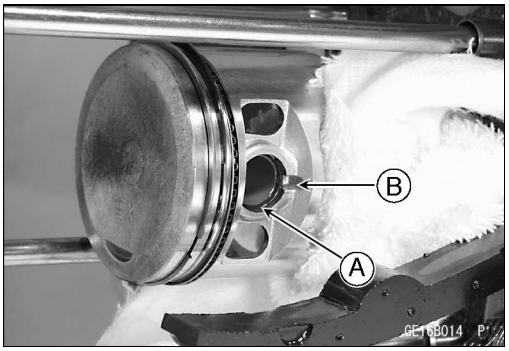
○ *If a new piston is used, check piston to cylinder clearance (see Piston/Cylinder Clearance), and use new piston rings.*

● Install the piston so that the EX mark [A] on the piston toward exhaust side.



Cylinder, Piston

● Fit a new piston snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.
○ When installing a piston pin snap ring, compress it only enough to install it no more.

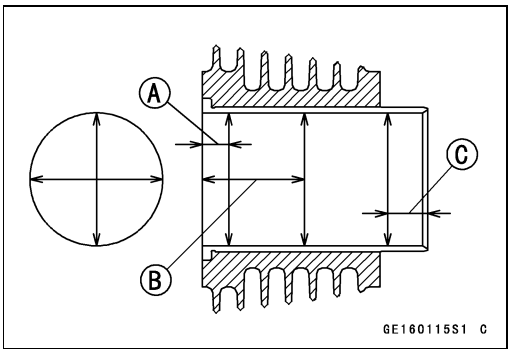


CAUTION

Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.

Cylinder Inside Diameter Measurement

● Since there is a difference in cylinder wear in different directions, take a side to side and a front to back measurement at each of the 3 locations (total of 6 measurements) shown in the figure.
★If any of the cylinder inside diameter measurements exceeds the service limit, the cylinder will have to bored to oversize and then honed.



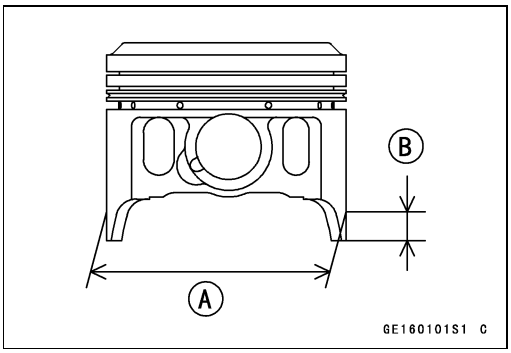
Cylinder Inside Diameter

Standard:	**52.997 ∼ 53.009 mm and less than 0.01 mm difference between any two measurements**
Service Limit:	**53.10 mm or 0.05 mm diffeence between any two measurements**

10 mm [A]
60 mm [B]
20 mm [C]

Piston Outside Diameter Measurement

● Measure the outside diameter [A] of the piston **7.8 mm** [B] up from the bottom of the piston at a right angle to the direction of the piston pin.



Piston Outside Diameter

Standard:	**52.981 ∼ 52.993 mm**
Servie Limit:	**52.83 mm**

NOTE

○ *Abnormal wear such as a marked diagonal pattern across the piston skirt may mean a bent connecting rod or crankshaft.*

Piston/Cylinder Clearance

The most accurate way to find the piston clearance is by making separate piston and cylinder diameter measurements and then computing the difference between the two values. Measure the piston diameter as just described, and measure the cylinder diameter at the very bottom of the cylinder.

Piston/Cylinder Clearance

Standard:	**0.010 ∼ 0.022 mm**

NOTE

○ *Whenever the piston or cylinder has been replaced with a new one, the motorcycle must be broken in the same as with a new machine.*

Cylinder, Piston

Boring, Honing

When boring and honing a cylinder, note the following:

○ There are two sizes of oversize pistons available. Oversize pistons require oversize rings.

Oversize Pistons and Rings

0.25 mm	Oversize
0.5 mm	Oversize
0.75 mm	Oversize
1.0 mm	Oversize

○ Before boring a cylinder, first measure the exact diameter of the service data section, oversize piston, and then, according to the standard clearance in the determine the rebore diameter. However, if the amount of boring necessary would make the inside diameter greater than 1.0 mm oversize, the cylinder block must be replaced.

○ Cylinder inside diameter must not vary more than 0.01 mm at any point.

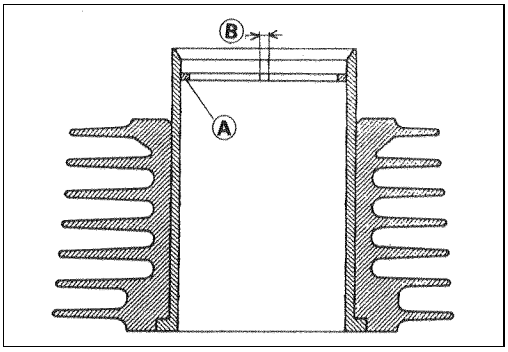
○ Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.

○ In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plus 0.1 mm and the service limit for the piston is the oversize piston original diameter minus 0.20 mm. If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.

Piston Ring End Gap

● Place the piston ring [A] inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.

● Measure the gap [B] between the ends of the ring with a thickness gauge.



Piston Ring End Gap

	Standard:	Service Limit:
Top	**0.15 ∼ 0.30 mm**	**0.6 mm**
Second	**0.30 ∼ 0.45 mm**	**0.8 mm**
Oil	**0.10 ∼ 0.60 mm**	**0.9 mm**

Piston Ring, Piston Ring Groove Inspection

● Visually inspects the piston rings and the piston ring grooves.

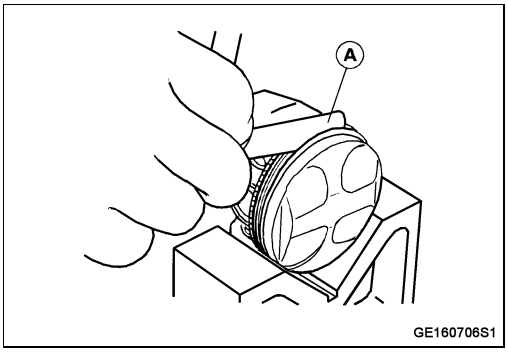
★ If the rings are worn unevenly or damaged, they must be replaced.

★ If the piston ring grooves are worn unevenly or damaged, the piston must be replaced and fitted with new rings.

● Check for uneven groove wear by inspecting the ring seating.

★ The rings should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced.

● With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring groove clearance.



Piston Ring/Groove Clearance

	Standard:	Service Limit:
Top	**0.02 ∼ 0.06 mm**	**0.16 mm**
Second	**0.01 ∼ 0.05 mm**	**0.15 mm**

Piston Ring Thickness

	Standard:	Service Limit:
Top	**0.77 ∼ 0.79 mm**	**0.7 mm**
Second	**0.77 ∼ 0.79 mm**	**0.7 mm**

Piston Ring Groove Width

	Standard:	Service Limit:
Top	**0.81 ∼ 0.83 mm**	**0.90 mm**
Second	**0.80 ∼ 0.82 mm**	**0.90 mm**

Cylinder, Piston

★If the clearance exceeds the service limit, remove the piston rings, and measure the thickness of the piston rings and the width of the ring grooves. If the ring has worn down to less than the service limit, replace the ring, if the groove width exceeds the service limit replace the piston.

NOTE

○ *These tables apply to oversize pistons and rings as well as standard and pistons and rings.*

Piston, Piston Pin, Connecting Rod Wear Inspection

● Visually inspect the snap rings [A] are fitted in place.

★If the ring shows weakness or deformation, replace the ring. Also if the pin hole groove shows excessive wear, replace the piston.

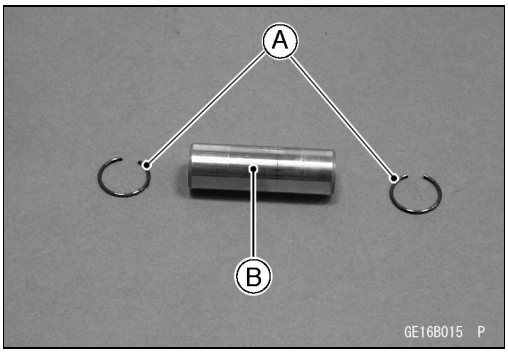
● Visually inspect the piston pin hole and connecting rod small end hole.

★If the piston pin hole shows uneven wear, replace the piston.

★If the rod small end hole shows uneven wear, replace the rod, or crankshaft assembly.

● Visually inspect the outer surface of the piston pin [B].

★If the pin shows color change or stepped wear, replace the pin and needle bearing.



Piston, Piston Pin, Connecting Rod Inspection

● Measure the inside diameter of both piston pin holes in the piston.

Piston Pin Hole Inside Diameter [A]

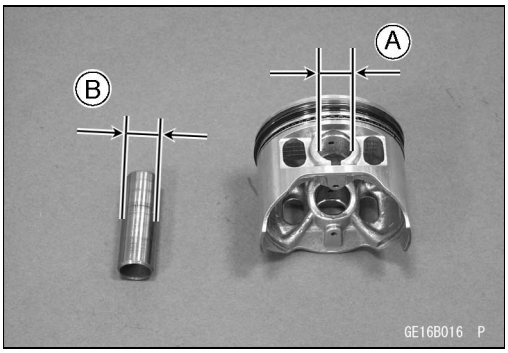
Standard:	**13.001 ∼ 13.007 mm**
Service Limit:	**13.07 mm**

★If either piston pin hole inside diameter exceeds the service limit, replace the piston.

● Measure the diameter of the piston pin.

Piston Pin Diameter [B]

Standard:	**12.995 ∼ 13.000 mm**
Service Limit:	**12.96 mm**



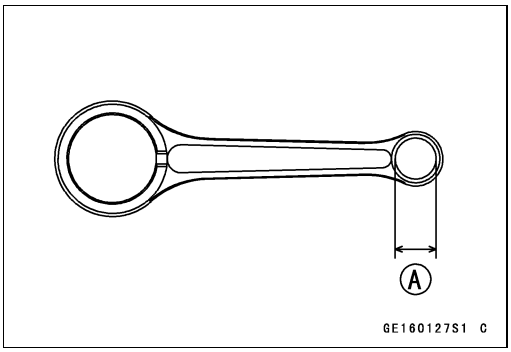
★If the piston pin diameter is less than the service limit at any point, replace the piston pin.

★Measure the inside diameter[A] of the connecting rod small end.

Connecting Rod Small End Inside Diameter

Standard:	**13.003 ∼ 13014 mm**
Service limit	**13.05 mm**

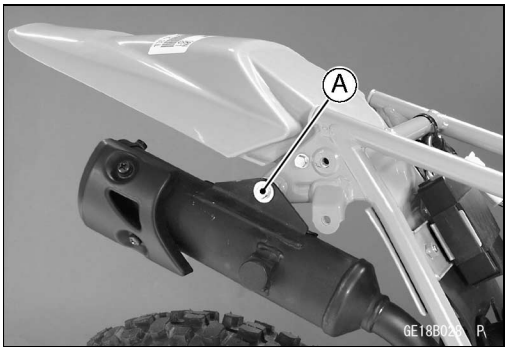
★If the inside diameter exceeds the service limit, replace the connecting rod.



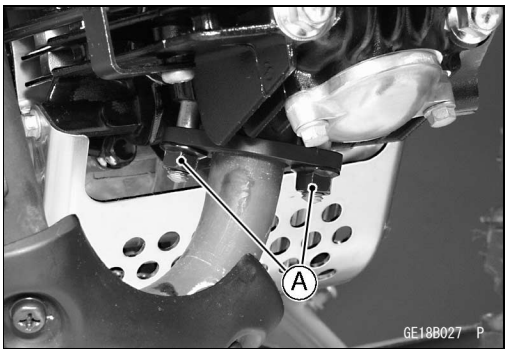
Muffler

Muffler Removal

● Unscrew the muffler mounting bolt [A].



● Remove the exhaust pipe holder nuts [A].



★ Pull out the muffler mounting bolt and remove the muffler assembly.

Muffler Installation

● Check the gasket and replace it if damaged.

● After tightening the mounting bolt and nuts securely, thoroughly warm up the engine, wait until the engine cools down and tighten all mounting bolt and nuts.

Spark Arrester Cleaning

○ Refer to Spark Arrester Cleaning in the Periodic Maintanance Chapter.

Clutch

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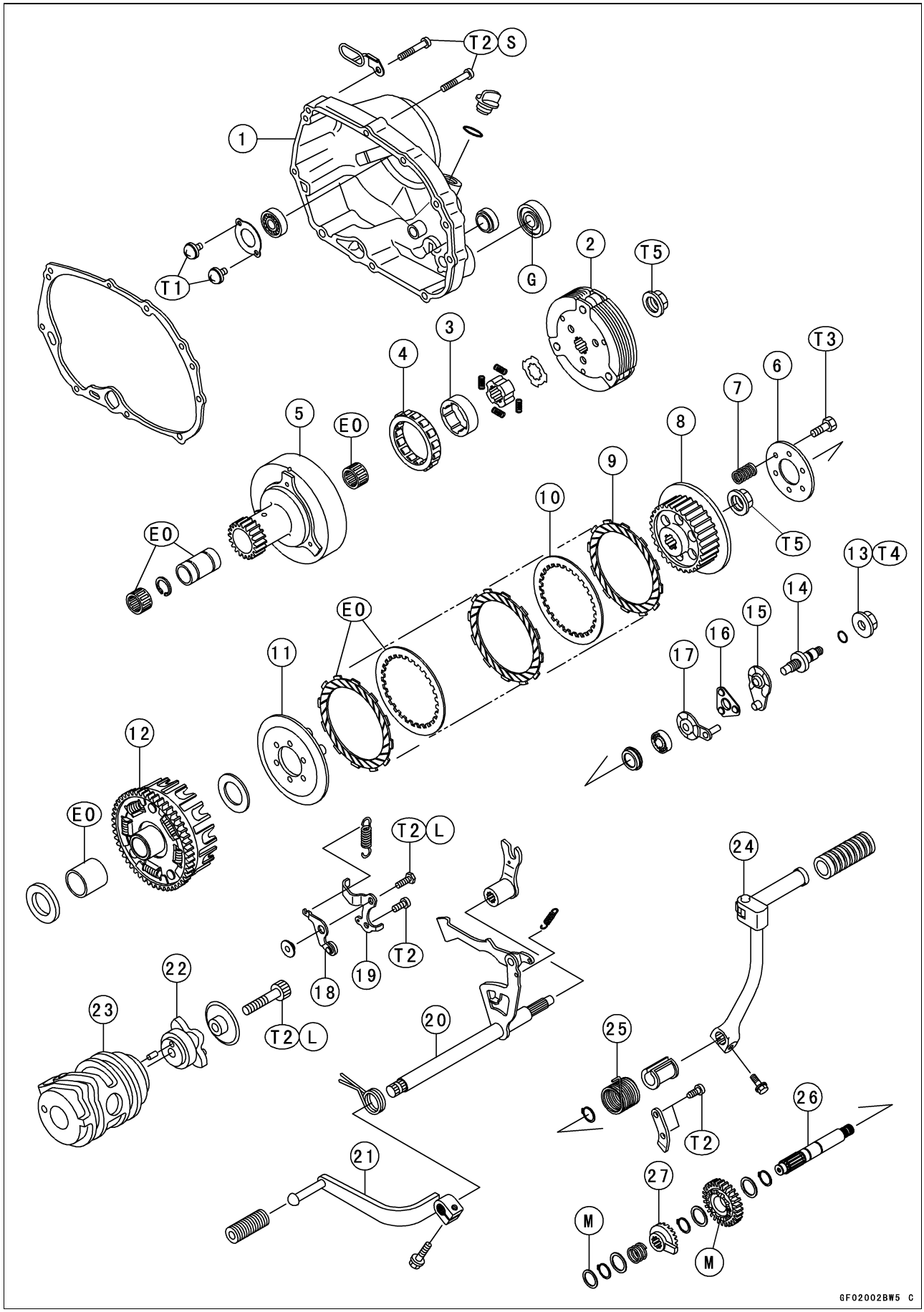
Exploded View



Exploded View

G: Apply grease.
L: Apply a non-permanent locking agent
M: Apply molybdenum disulfide grease.
EO: Apply engine oil.
S: Follow the specific tightening sequence.
T1: 2.9 N·m (0.3 kgf·m, 26 in·lb)
T2: 5.2 N·m (0.53 kgf·m, 46 in·lb)
T3: 3.4 N·m (0.35 kgf·m, 30 in·lb)
T4: 19 N·m (1.9 kgf·m, 14 ft·lb)
T5: 72 N·m (7.3 kgf·m, 53 ft·lb)
1. Clutch Cover
2. Primary Clutch Shoe Linings
3. Outer Race
4. One-way Clutch
5. Primary Clutch Housing
6. Clutch Spring Plate
7. Clutch Spring
8. Secondary Clutch Hub
9. Friction Plate
10. Steel Plate
11. Clutch Wheel
12. Clutch Housing
13. Clutch Adjusting Screw Locknut
14. Release Shaft (Adjusting Screw)
15. Release Plate
16. Release Ball Assembly
17. Release Cam
18. Gear Positioning Lever
19. Gear Positioning Plate
20. Shift Shaft
21. Shift Pedal
22. Shift Drum Can
23. Shift Drum
24. Kick Pedal
25. Return Spring
26. Kick Shaft
27. Rachet

5-4 CLUTCH

Specifications

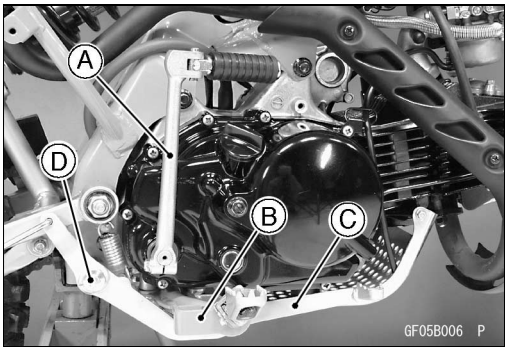
Item	Standard	Service Limit
Primary Clutch:		
Primary clutch housing inside diameter	104.0 ∼ 104.2 mm	104.5 mm
Primary clutch shoe groove depth	1.0 mm	0.5 mm
Secondary Clutch:		
Friction plate thickness	3.1 ∼ 3.3 mm	2.9 mm
Friction plate warp	0.2 mm or less	0.3 mm
Steel plate warp	0.15 mm or less	0.3 mm
Clutch spring free length	24.0 mm	23.0 mm
Kick Shaft:		
Kick shaft diameter	15.957 ∼ 15.984 mm	15.93 mm
Kick gear inside diameter	16.000 ∼ 16.018 mm	16.04 mm

Special Tools - Primary Clutch Holder: 57001–1507
Clutch Holder: 57001–1508

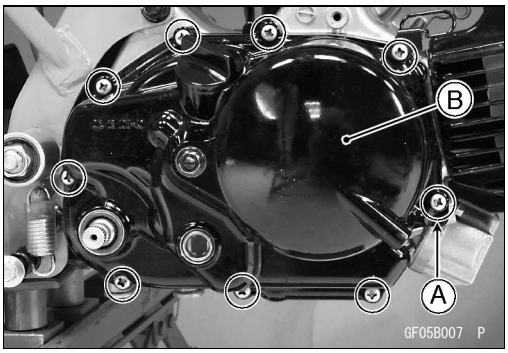
Clutch Cover

Clutch Cover and Oil Screen Removal

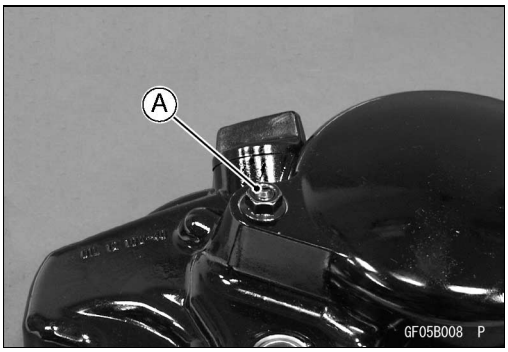
- Drain the engine oil (see Engine Lubrication System).
- Remove:
  Kick Pedal [A]
  Footpeg [B]
  Engine Guard [C]
  Brake Pedal (hanging) [D]

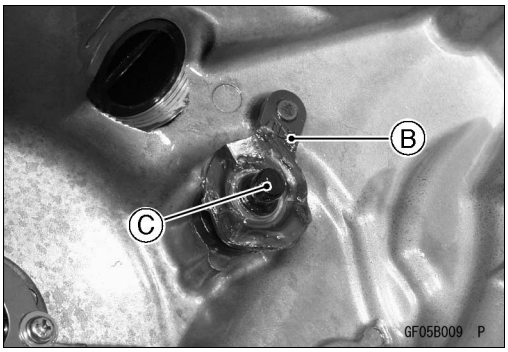


  Clutch Cover Screws [A]
- Pull out the clutch cover [B].

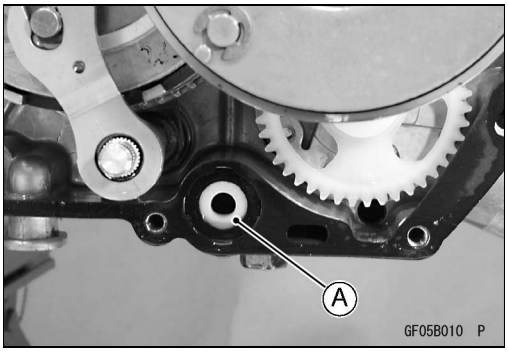


- Unscrew the clutch adjusting screw locknut [A].
- The release plate [B] and the release shaft (adjusting screw) [C] come out with the cover.





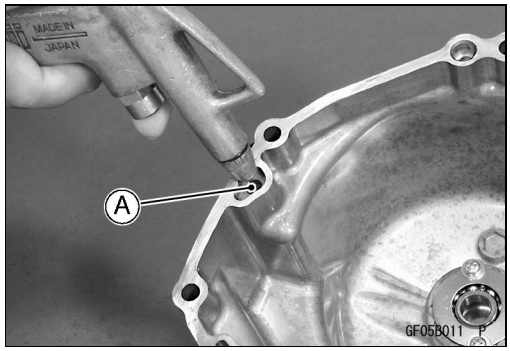
- Pull out the oil screen [A].



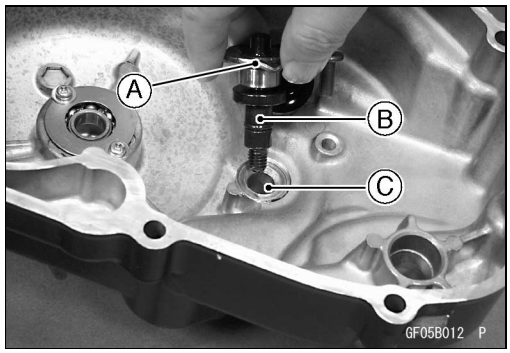
Clutch Cover

Clutch Cover and Oil Screen Installation

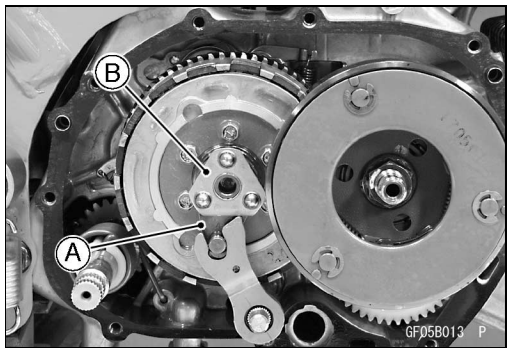
- Clean any metal particles and other dirt out of the oil screen.
- Using compressed air, blow out any particles which may obstruct the oil passage [A] in the clutch cover.



- Check that the ball bearing is in place. The shield side of the bearing must be faced to the clutch cover.
- Apply grease to the O-ring and install it.
- Turn in the release plate [A] into the release shaft [B] fully but no tightly and then back it out the three turns, and insert it into the hole [C] of clutch cover securely.
- Tighten the locknut into the release shaft from the opposite side.



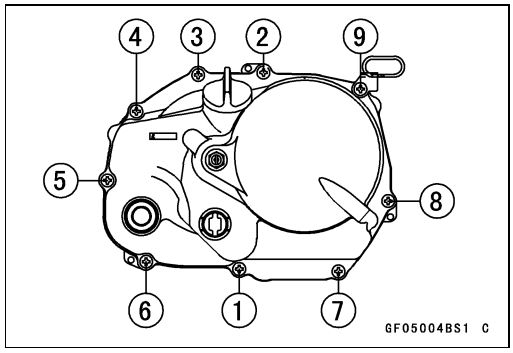
- Apply grease to the kick shaft oil seal lips.
- Check that the two dowel pins are in place on the crankcase.
- Install the clutch cover. Be sure that the release cam [A], and release ball assembly [B] are not falling down.



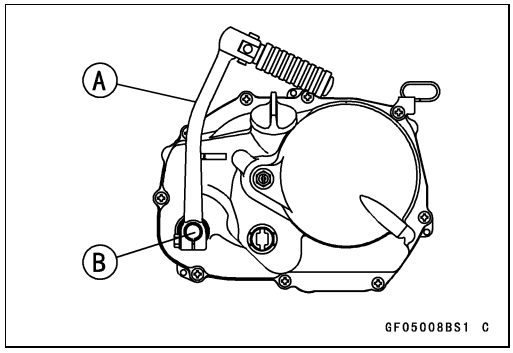
- Tighten the clutch cover screws following the tightening sequence.

  Torque - Clutch Cover Screw: 5.2 N·m (0.53 kgf·m, 46 in·lb)

- Adjust the clutch.



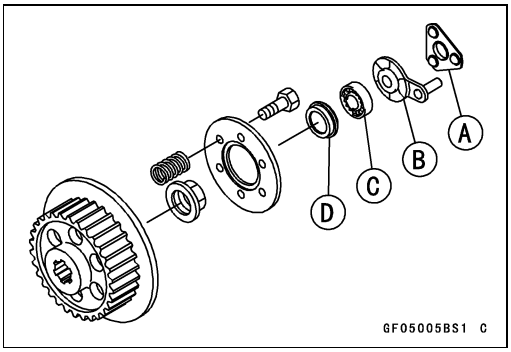
- Install the kick pedal [A] to the kick shaft [B], as shown.



Clutches

Clutch Removal

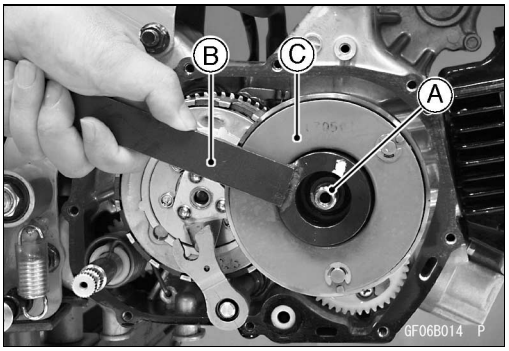
- Remove the clutch cover (see this chapter).
- Remove:
  Release Ball Assembly [A]
  Release Cam [B]
  Ball Bearing [C]
  Ball Bearing Holder [D]



- Remove the primary clutch hub nut [A], while holding the primary clutch steady with the primary clutch holder [B].

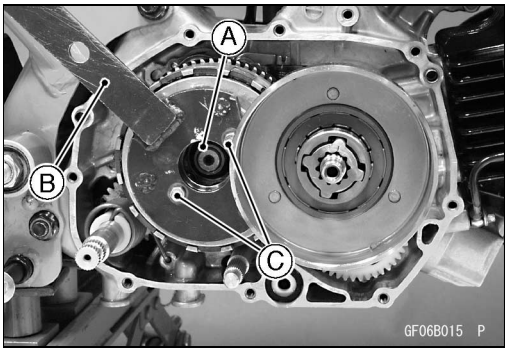
  Special Tools - Primary Clutch Holder: 57001–1507

- Pull out the primary clutch hub [C].

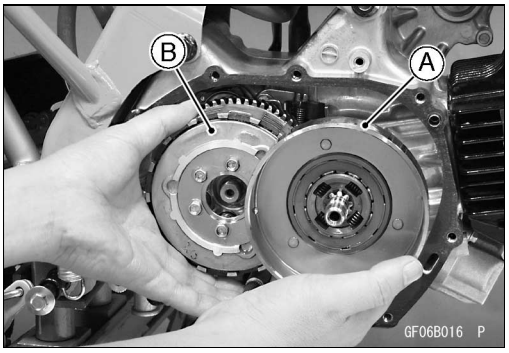


- Remove the secondary clutch hub nut [A], while holding the secondary clutch steady with the clutch holder [B].
- ○ Search the positions of three notches of clutch holder, which can be aligned.
- ○ Remove two clutch spring bolts [C] inserted into the two holes of clutch holder when searching.
- ○ Set a clutch holder.

  Special Tools - Clutch Holder: 57001–1508



- Remove the primary clutch [A] and secondary clutch [B] together.
- ○ Do not remove the one-way clutch from the primary clutch.
- Remove the spacer from the drive shaft.

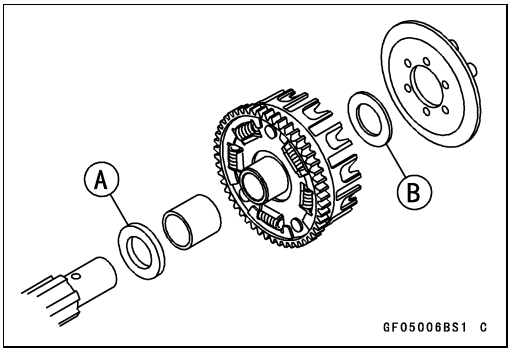


Clutch Installation

- Apply engine oil to the clutch sleeves, drive shaft, and crankshaft.
- Install the spacer [A] to the drive shaft.
- Insert the secondary clutch.
- ○ Be sure to install the spacer [B] between secondary clutch housing and clutch wheel.
- ○ Hard to install the secondary clutch, turn the drive shaft while pushing the clutch.
- Tighten the secondary clutch nut, while holding the secondary clutch holder.

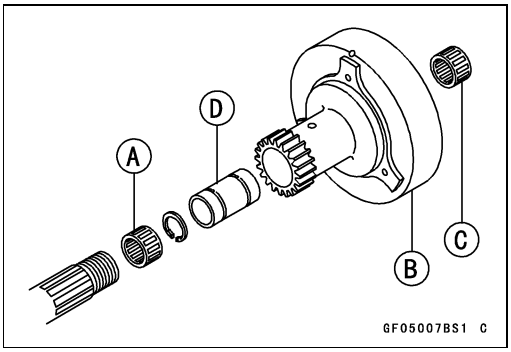
  Torque - Secondary Clutch Hub Nut: 72 N·m (7.3 kgf·m, 53 ft·lb)

  Special Tools - Clutch Holder: 57001–1508

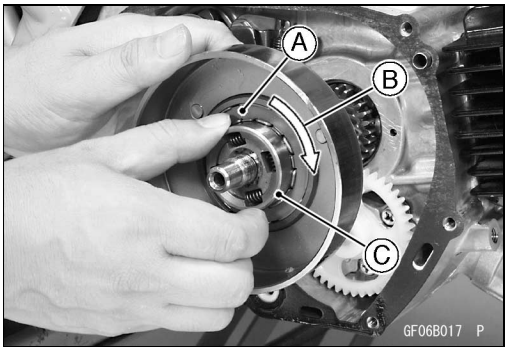


Clutches

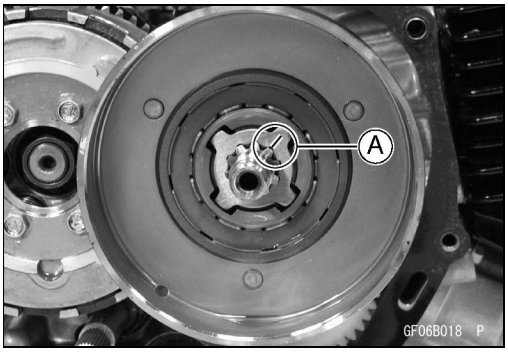
● Install:
Needle Bearing [A]
Primary Clutch Housing [B]
Needle Bearing [C]
Primary Clutch Sleeve [D]



★If the one-way clutch and race dropped from the primary clutch housing, install it as follows.
○ Put the one-way clutch [A] in the clutch housing halfway with the rotation mark [B] facing out.
○ Fit the race [C] into the one-way clutch and push them together in the clutch housing.



● Install the plate with the line mark [A] facing out, nothing the proper position.

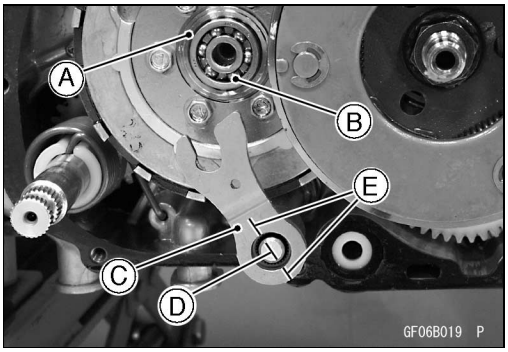


● Install the clutch hub.
● Tighten the primary clutch nut while holding the primary clutch steady with the primary clutch holder.

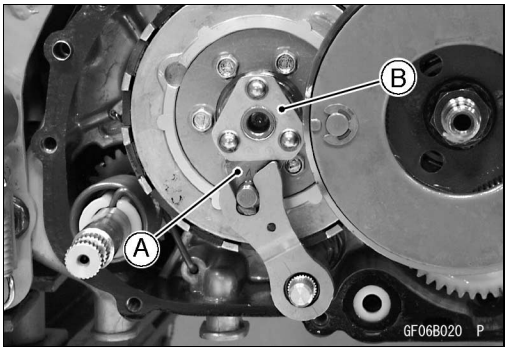
Special Tools - Primary Clutch Holder: 57001–1507

Torque - Primary Clutch Hub Nut: 72 N·m (7.3 kgf·m, 53 ft·lb)

● Install the ball bearing holder [A] and ball bearing [B].
● Install the release lever [C] to the shift shaft, with shift shaft line [D] aligning to release lever line [E].



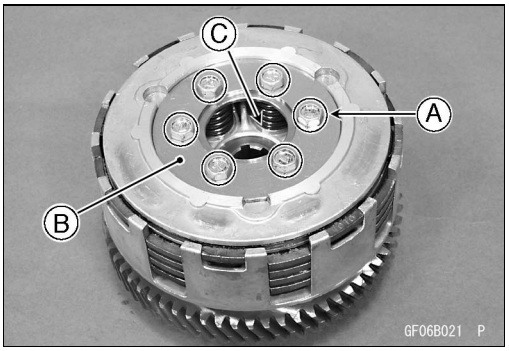
● Apply grease to the release cam and release ball assembly.
● Install the release cam [A] and release ball assembly [B].
● Install the clutch cover.
● Adjust the clutch.



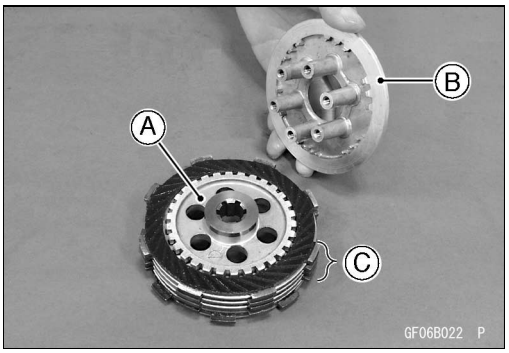
Clutches

Secondary Clutch Disassembly

- Remove the secondary clutch.
- Unscrew the clutch spring bolts [A] and take off the spring plate [B] and springs [C].

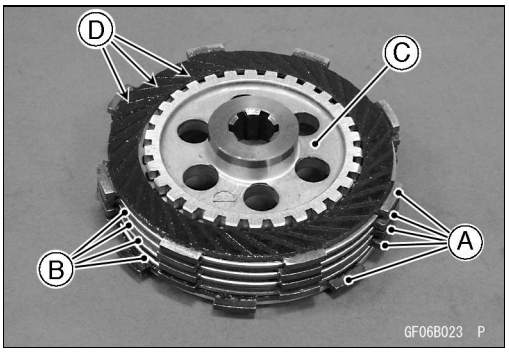


- Remove the clutch hub [A] and clutch wheel [B].
- Remove the secondary clutch plate [C].



Secondary Clutch Assembly

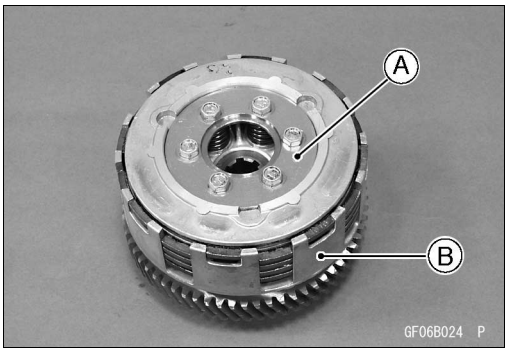
- Install the friction plates [A] and steel plates [B] on the secondary clutch hub [C], starting with a friction plate and alternating them.
- ○ The grooves [D] on the friction plate surfaces are cut tangentially and radially. Install the friction plates so that the grooves run toward the center in the direction of the clutch housing rotation (counterclockwise viewed from the engine right side).



CAUTION

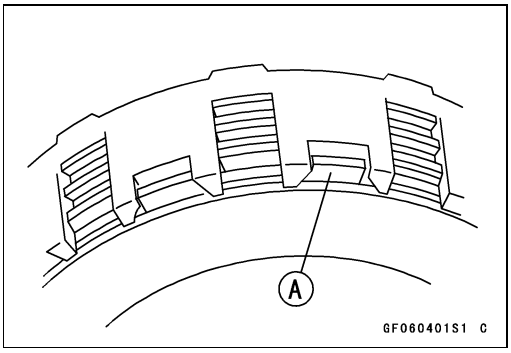
If new dry steel plates and friction plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

- Install the clutch wheel on the clutch hub.
- Install the clutch spring plate [A] with the springs and spring bolts temporarily and fit the clutch hub and plate assembly into the clutch housing [B].



- Install the last friction plate [A] fitting the tangs in the grooves on the housing as shown.
- Tighten the clutch spring bolts.

Torque - Secondary Clutch Spring Bolts: 3.4 N·m (0.35 kgf·m, 30 in·lb)



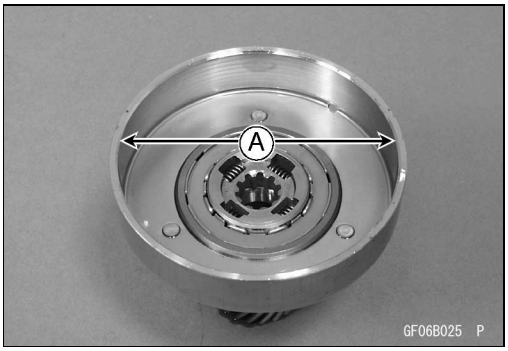
Clutches

Primary Clutch Housing Wear

- Measure the inside diameter [A] of the clutch housing sliding surface.
- Use a vernier calipers and measure at several points as shown.
- ★If any measurement is greater than the service limit, replace the primary clutch housing.

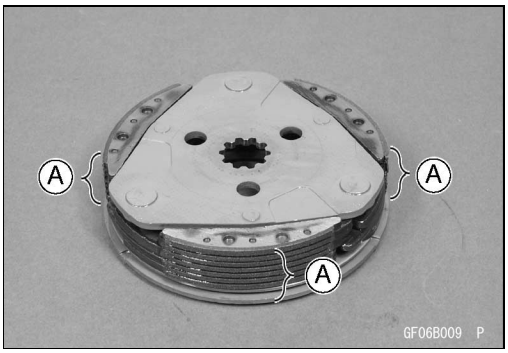
Primary Clutch Housing Inside Diameterr

Standard:	**104.0 ∼ 104.2 mm**
Serice Limit:	**104.5 mm**



Primary Clutch Shoe Lining Wear

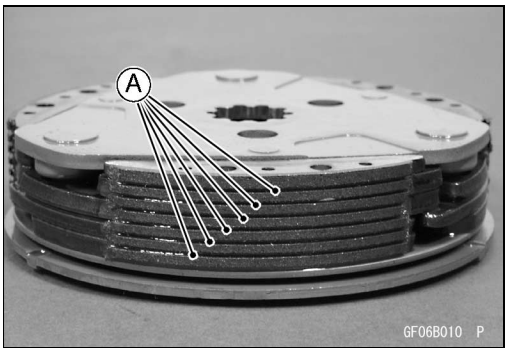
- Remove the primary clutch hub (see Clutch Removal).
- Visually inspect the primary clutch shoe linings [A] for uneven wear, discoloration, missing friction material, cracks or other damage.
- ★If any of the linings are damaged, replace the primary clutch hub.



- Measure the groove depth [A].
- Use a depth gauge, and measure at several points as shown.
- ★If any measurement is less than the service limit, replace the primary clutch hub.

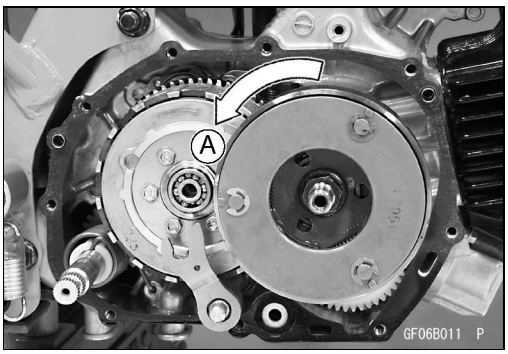
Primary Clutch Shoe Groove Depth

Standard:	**1.0 mm**
Service Limit:	**0.5 mm**

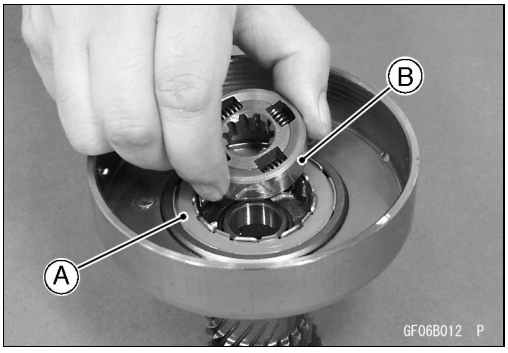


One-Way Clutch Inspection

- Remove the clutch cover.
- Turn the primary clutch housing by hand. When view from the right side of the engine, the primary clutch housing should turn counter-clockwise freely [A] but should not turn clockwise.

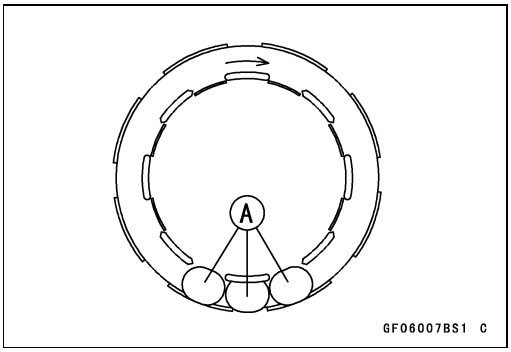


- ★If the one-way clutch does not operate as it should or if it makes noise, go to the next steps.
- Remove the primary clutch.
- Check that the one-way clutch is installed so that the rotation mark faces out.
- Visually inspect the one-way clutch [A] and the outer race [B] in the primary clutch housing.
- ★If there is any worn or damaged part, replace it.



Clutches

○ Check that the rollers [A] in the one-way clutch is installed as shown when viewed from the right side of the engine.



Clutch Plate Wear and Damage

- Visually inspect the friction and steel plates for uneven wear, discoloration, missing friction material, cracks, or other damage.

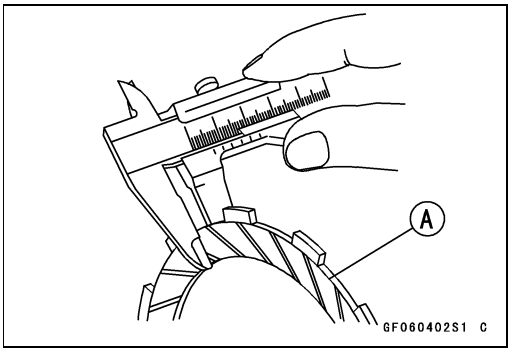
★If any plates show signs of damaged, replace the friction and steel plates as a set.

- Measure the thickness of the friction plates [A] at several points.

Friction Plate Thickness

Standard:	**3.1 ∼ 3.3 mm**
Service Limit:	**2.9 mm**

★If any of the measurement is less than the service limit, replace the plates as a set.



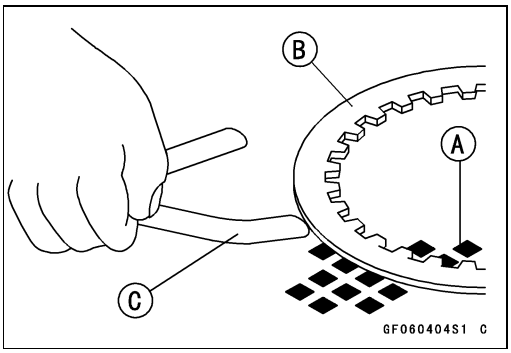
Clutch Plate Warp

- Place each friction plate or steel plate [B] on a surface plate [A] and measure the gap between the surface plate and each plate with a thickness gauge [C]. The gap is the amount of friction and steel plate warp.

★If any of the clutch plate is warped beyond the service limit, replace the plate with a new one.

Friction Plate and steel Plate Warp

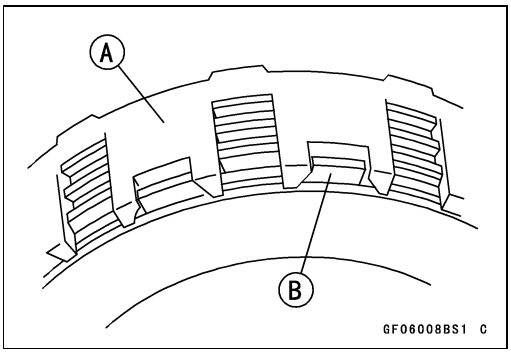
Standard:	**0.15 mm or less (Steel Plate)**
	0.2 mm or less (Friction Plate)
Service Limit:	**0.3 mm**



Secondary Clutch Housing Finger Damage

- Visually inspect the clutch housing finger [A] where the friction plate tangs [B] hit them.

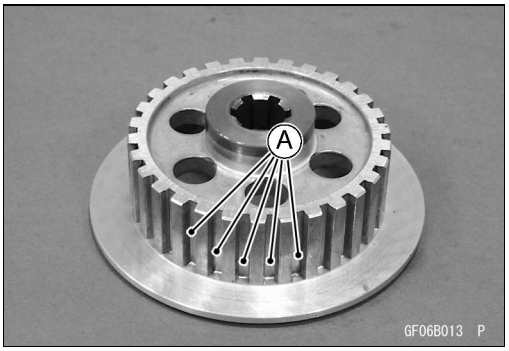
★If they are badly worn or if there are groove cuts where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.



Secondary Clutch Hub Spline Damage

- Visually inspect where the teeth on the steel plates wear against the clutch hub splines.

★If there are notches worn into the clutch hub splines [A], replace the clutch hub. Also, replace the steel plates if their teeth are damaged.



Clutches

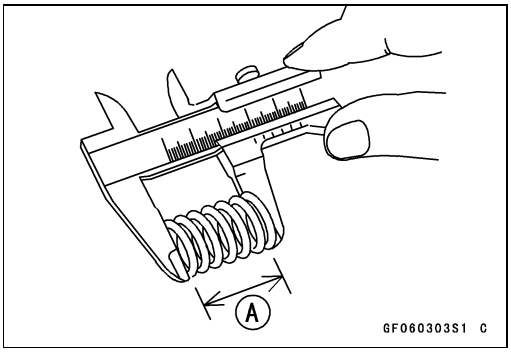
Secondary Clutch Spring Free Length Measurement

● Measure the spring free length [A].

★ If measurement is less than the service limit, replace it.

Clutch Spring Free Length

Standard:	**24.0 mm**
Service Limit:	**23.0 mm**



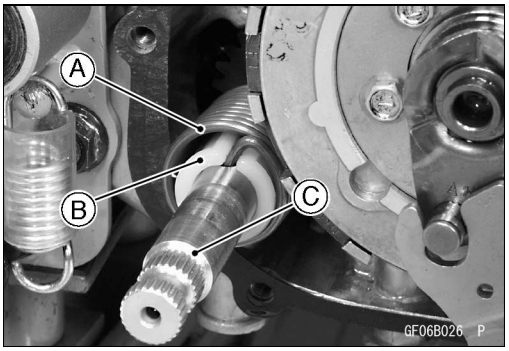
Clutch Adjustment

○ Refer to Clutch Adjustment in the Periodic Maintenance Chapter.

Kickstarter

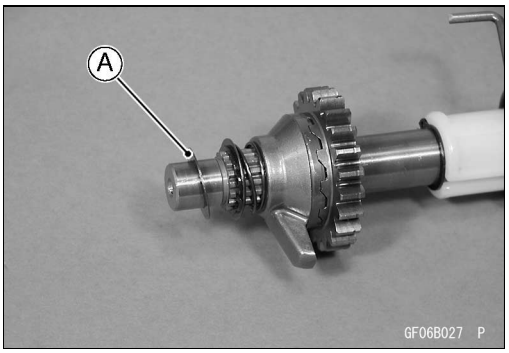
Kickstarter Removal

- Remove the clutch cover.
- Remove the return spring [A] with pliers.
- Remove:
  Spring Guide [B]
- Remove the kick shaft assembly [C], twisting it counterclockwise.
- There is a thrust washer between the kick shaft end and the crankcase.



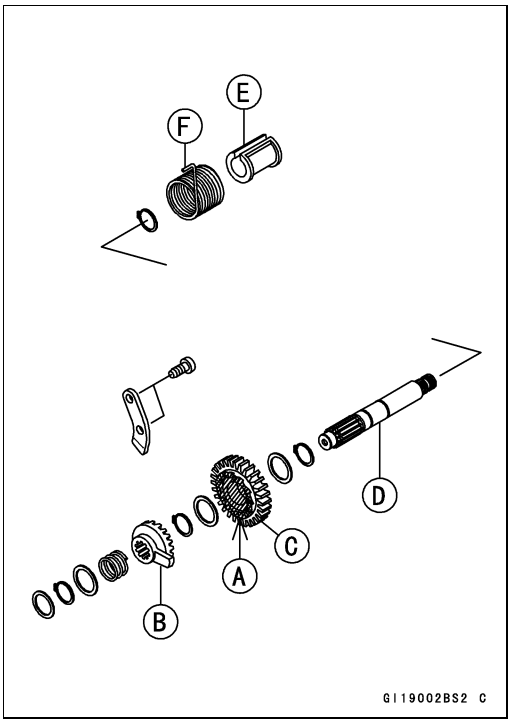
Kickstarter Installation

- Apply molybdenum disulfide grease to the thrust washer.
- Put the thrust washer [A] on the kick shaft end, and fit the kick shaft assembly in the crankcase.
- Fit the return spring end into the kick shaft, turn the spring clockwise and insert the other end of the spring into the crankcase.
- Install the plastic spring guide.
- Install the clutch cover.



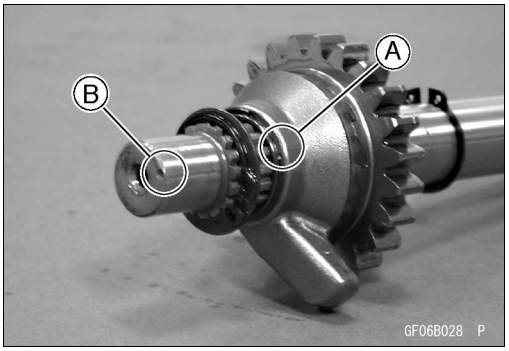
Kickstarter Assembly

- Apply a thin coat of molybdenum disulfide grease [A] to the ratchet teeth and the kick gear inside.
  Ratchet [B]
  Kick Gear [C]
  Kick Shaft [D]
  Spring Guide [E]
  Return Spring [F]



Replace the circlips that were removed with new ones.

- Align the ratchet punch mark [A] with the punch mark [B] on the kick shaft.



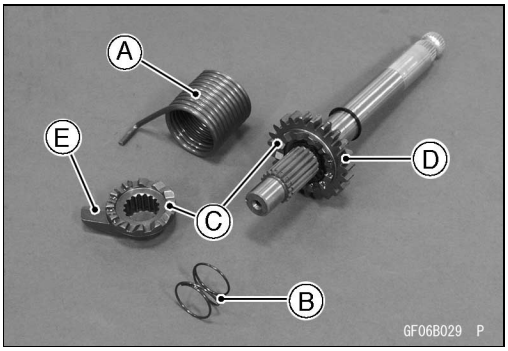
CAUTION
Misalignment of the ratchet changes the kick spring preload. Light preload could cause mechanism noise and heavy preload could weaken or break the spring.

Kickstarter

Kickstarter Inspection

- Visually inspect the parts and portion listed below.
  Kick shaft return spring [A]
  Ratchet gear spring [B]
  Ratchet portion [C] of the kick gear [D] and ratchet gear [E]

★If there is any kind of damage, replace the damaged part.

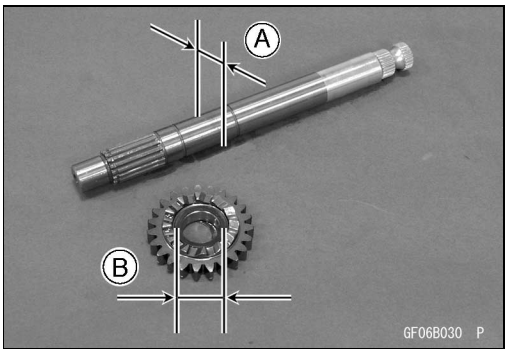


- Measure the kick shaft diameter [A] where the kick gear fits.

★If it is under the service limit, replace the shaft.

- Measure the inside diameter [B] of the kick gear.

★If it exceeds the service limit, replace the gear.



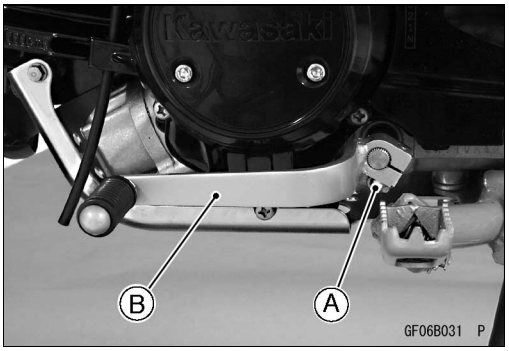
Kick Shaft, Kick Gear Diameter

Kick Shaft	**Standard:**	**15.957 ∼ 15.984 mm**
	Service Limit:	**15.93 mm**
Kick Gear	**Standard:**	**16.000 ∼ 16.018 mm**
	Service Limit:	**16.04 mm**

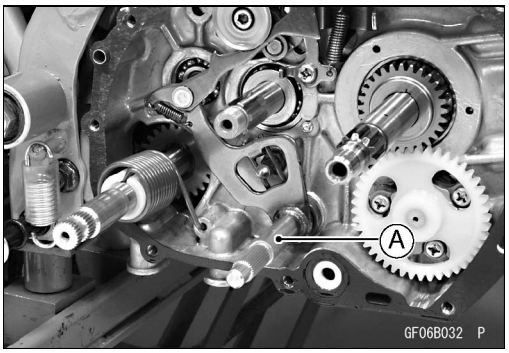
External Shift Mechanism

External Shift Mechanism Removal

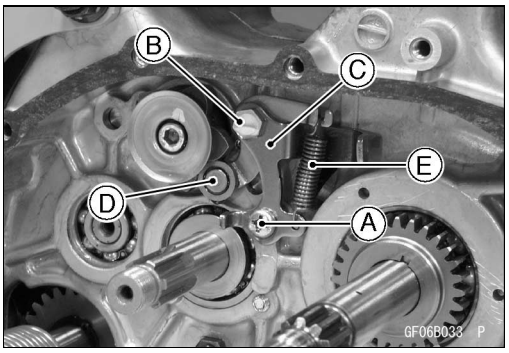
- Remove:
  Clutch Cover
  Primary Clutch
  Secondary Clutch
  Shift Pedal Clamp Bolt [A]
  Shift Pedal [B]



- Move the shift mechanism arm out of its position on the end of the shift drum and pull out the shift shaft [A].



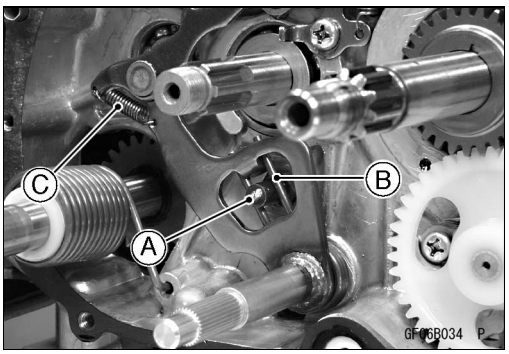
- Remove the screw [A] and pivot bolt [B].
- Remove the gear positioning plate [C], gear positioning lever [D] and its spring [E] as a set.



External Shift Mechanism Installation

- Apply non-locking agent to the lever pivot bolt.
- Install the gear positioning lever, plate and spring.
- ○ Check that the return spring pin [A] is not loose.
- ○ Check that the return spring [B] and shift arm spring [C] are properly fitted on the mechanism.

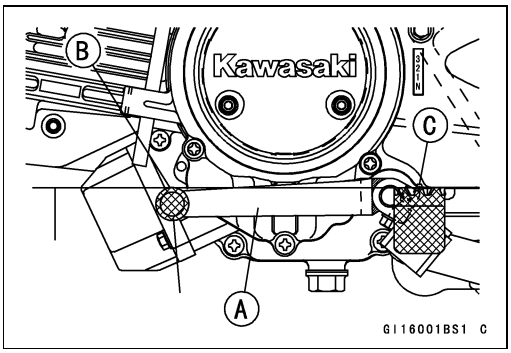
Torque - Shift Drum Positioning Lever Pivot Bolt: 5.2 N·m (0.53 kgf·m, 46 in·lb)
Shift Drum Position Plate Screw: 5.2 N·m (0.53 kgf·m, 46 in·lb)



- Apply high-temperature grease to the oil seal lips.
- Install the shift shaft.
- Install the removed parts.

Torque - Return Spring Pin: 22 N·m (2.2 kgf·m, 16 ft·lb)

- Install the shift pedal [A] to the shift shaft so that the pedal upper surface [B] is level with the step upper surface [C].



Engine Lubrication System

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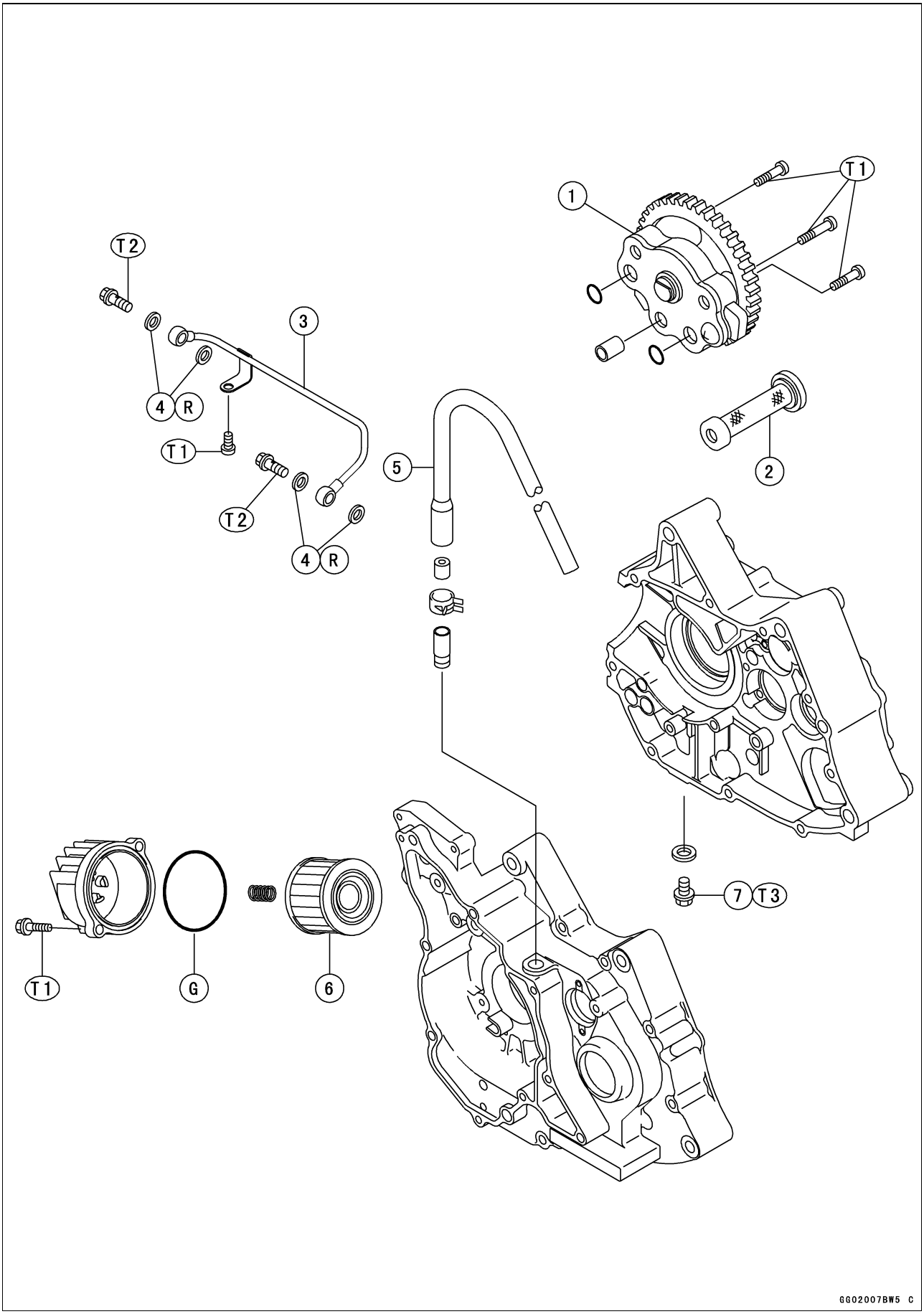
Exploded View



Exploded View

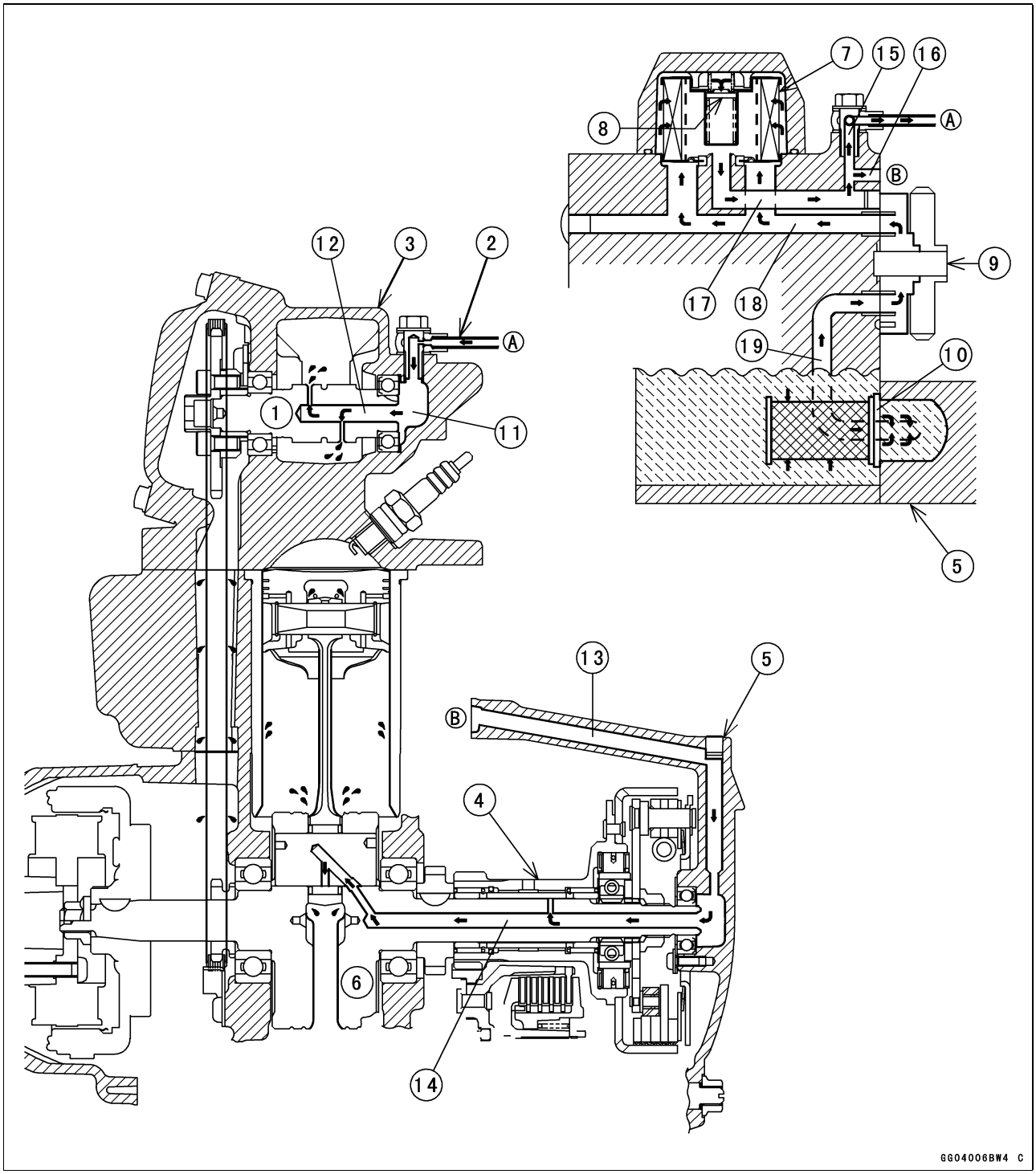
T1: 5.2 N·m (0.53 kgf·m, 46 in·lb)
T2: 15 N·m (1.5 kgf·m, 11 ft·lb)
T3: 29 N·m (3.0 kgf·m, 21 ft·lb)
G: Apply grease.
R: Replacement parts
1. Oil Pump
2. Oil Screen
3. Oil Pipe
4. Copper Washer
5. Crankcase Breather Tube
6. Oil Filter
7. Drain Plug

6-4 ENGINE LUBRICATION SYSTEM

Specifications

Item	Standard	Service Limit
Engine Oil:		
Type:	API SE, SF or SG	- - -
	API SH or SJ with JASO MA	
Viscosity:	SAE 10W-40	- - -
Capacity:		
(When engine is completely dry)	1.1 L	- - -
(When filter is removed)	1.0 L	- - -
(When filter is not removed)	0.9 L	- - -
Level	Between upper and lower level lines	- - -

Engine Oil Flow Chart



1. Camshaft
2. Oil Pipe
3. Cylinder Head
4. Primary Clutch Housing
5. Clutch Cover
6. Crankshaft
7. Oil Filter
8. Bypass Valve
9. Oil Pump
10. Oil Screen
11. Oil Passage (Cylinder Head)
12. Oil Passage (Camshaft)
13. Oil Passage (Right Engine Cover)
14. Oil Passage (Crankshaft)
15. Oil Passage to Cylinder Head
16. Oil Passage to Crankshaft
17. Oil Passage from Oil Filter
18. Oil Passage to Oil Filter
19. Oil Passage to Oil Pump

6-6 ENGINE LUBRICATION SYSTEM

Engine Oil

Oil Level Inspection

○ Refer to Oil Level Inspection in the Periodic Maintenance Chapter.

Oil Changing

○ Refer to Oil Changing in the Periodic Maintenance Chapter.

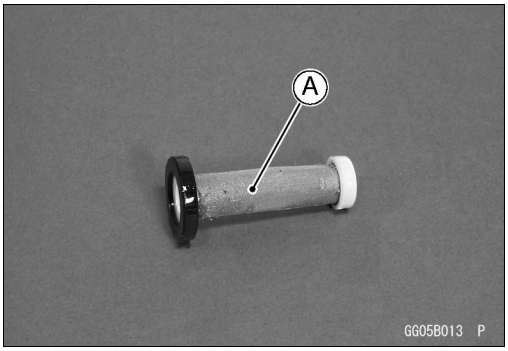
Oil Filter Element/Oil Screen

Oil Filter Element Change

○ Refer to Oil Filter Element Change in the Periodic Maintenance Chapter.

Oil Screen Cleaning

● Drain the engine oil.
● Remove the clutch cover (see Clutch chapter).
● Pull out the oil screen [A].
○ Clean the screen with high-flash-point solvent, and then dry it.
○ Clean the screen thoroughly whenever the engine oil is changed.



NOTE

○ *While cleaning the screen, check for any metal particles that engine indicate internal damage.*

⚠ WARNING

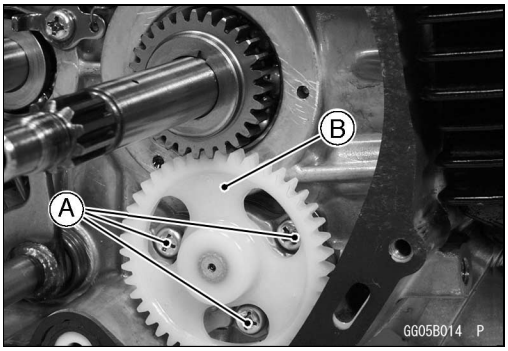
Clean the oil screen in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area, this includes any appliance with a pilot light.
Do not use gasoline or a low-flash-point solvent to clean the oil screen. A fire or explosion could result.

★ Replace the screen with a new one if it is damaged.
● Install:
Oil Screen
Clutch Cover

Engine Oil Pump

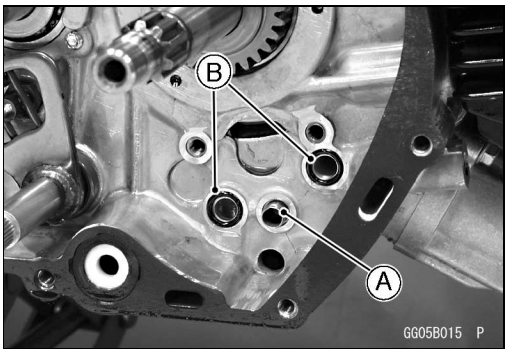
Engine Oil Pump Removal

- Remove the clutch cover (see Clutch chapter).
- Remove the primary and secondary clutch assemblies (see Clutch chapter).
- Turn the crankshaft so that the engine oil pump screws [A] can be removed through the pump gear holes, and remove the screws and oil pump [B].



Engine Oil Pump Installation

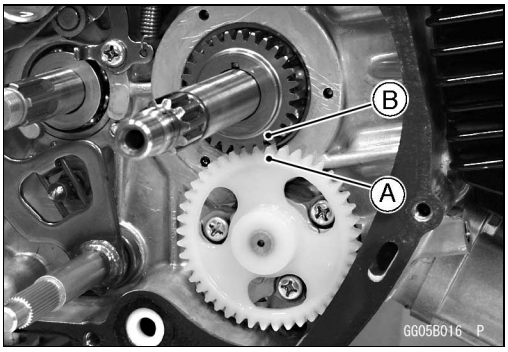
- Replace the O-rings with new ones if they are damaged.
- Check to see that the knock pin [A] and O-rings [B] are in place.



- Install the oil pump and screws.

○ When installing the oil pump, be sure the oil pump gear [A] and pump drive gear [B] on the crankshaft mesh properly.

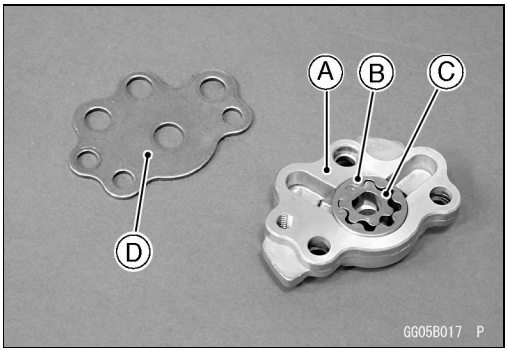
Torque - Oil Pump Mounting Screw: 5.2 N·m (0.53 kgf·m, 46 in·lb)



Engine Oil Pump Inspection

- Visually inspect the oil pump body [A], outer rotor [B], inner rotor [C] and cover [D].

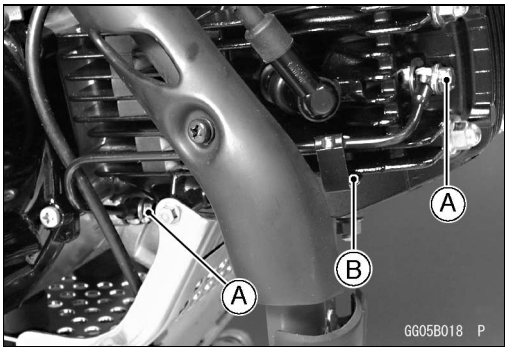
★ If there is any damage or uneven wear, replace the rotors or oil pump assembly.



Oil Pipe

Oil Pipe Removal

- Remove the banjo bolts [A] and oil pipe clamp screw [B].



Oil Pipe Installation

- Before installation, flush out the pipe with a high-flash-point solvent.
- Discard the used copper washers and install new washers on each side of the pipe fittings.
- Lightly tighten the banjo bolts and oil pipe clamp screw to a snug fit, and tighten them to the specified torque.

Torque - Oil Pipe Banjo Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)
Oil Pipe Clamp Screw: 5.2 N·m (0.53 kgf·m, 46 in·lb)

Engine Removal/Installation

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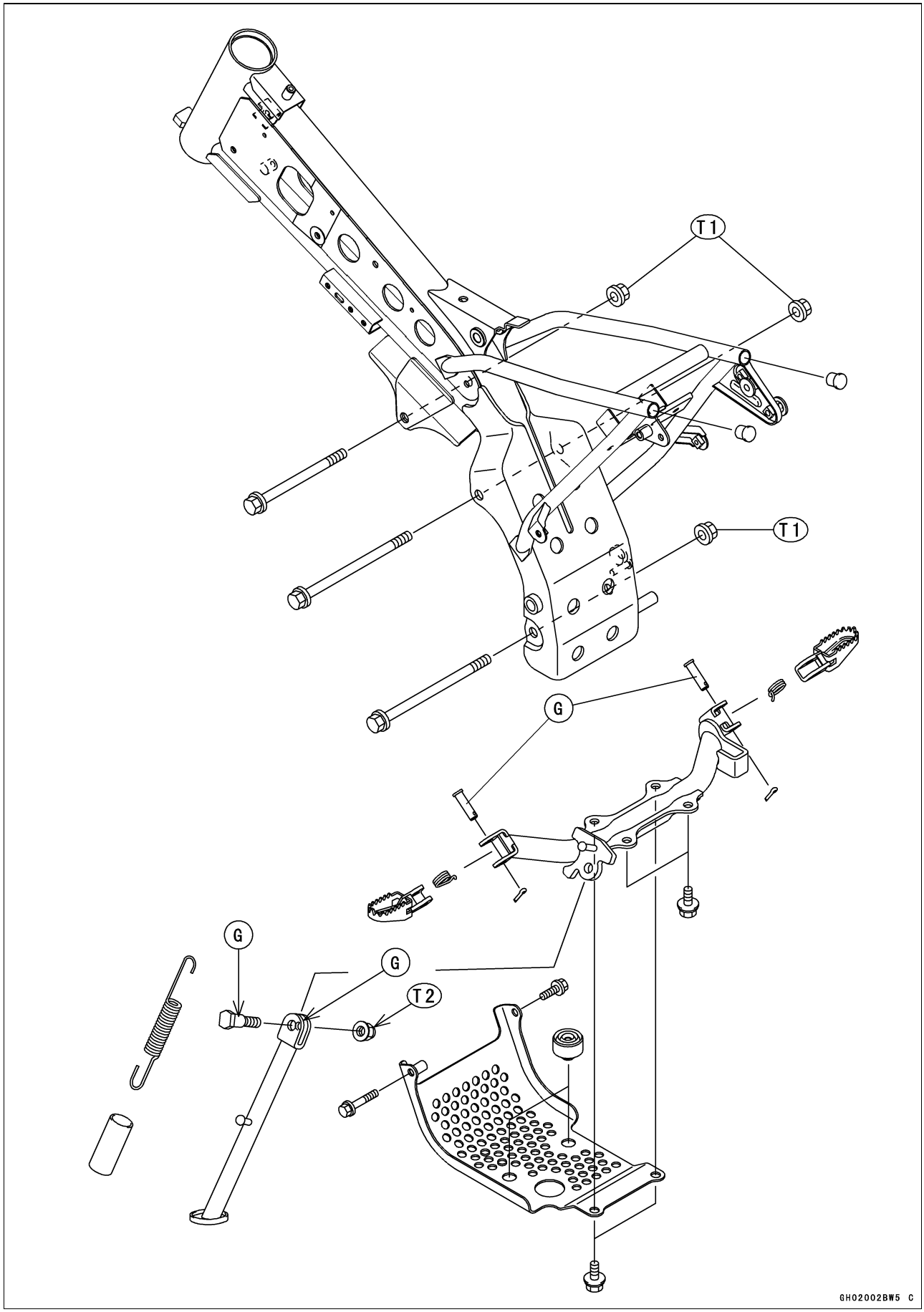
Exploded View



Exploded View

T1: 54 N·m (5.5 kgf·m, 40 ft·lb)
T2: 23 N·m (2.3 kgf·m, 17 ft·lb)
G. Apply grease.

7-4 ENGINE REMOVAL/INSTALLATION

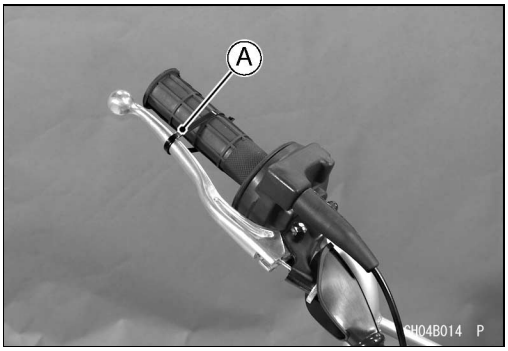
Engine Removal/Installation

Engine Removal

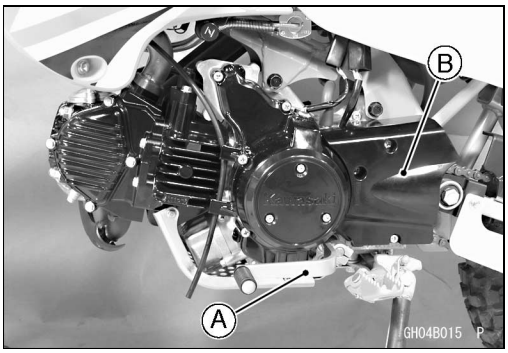
- Drain the engine oil (see Engine Lubrication chapter).
- Squeeze the brake lever slowly and hold it with a band [A].

⚠ WARNING

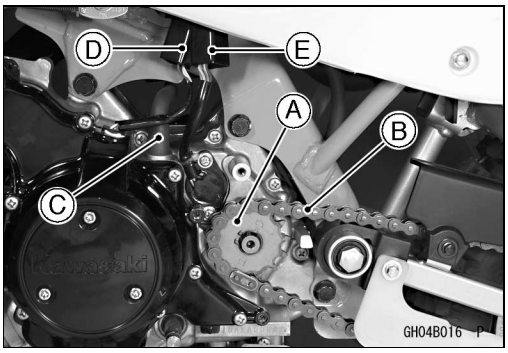
Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. It could cause an accident and injury.



- Remove
  Shift Pedal [A]
  Engine Sprocket Cover [B]

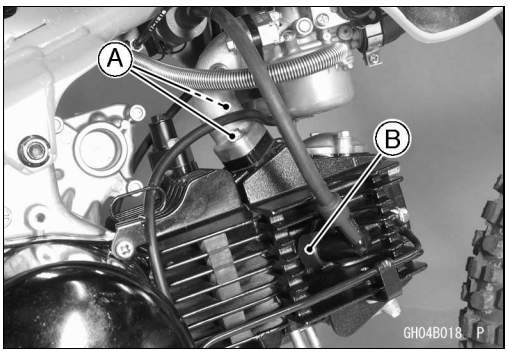


Engine Sprocket [A]
Drive Chain [B]
Breather Tube Lower End [C]
Magneto Lead Connectors [D]
Gear Position Switch Lead Connector [E]



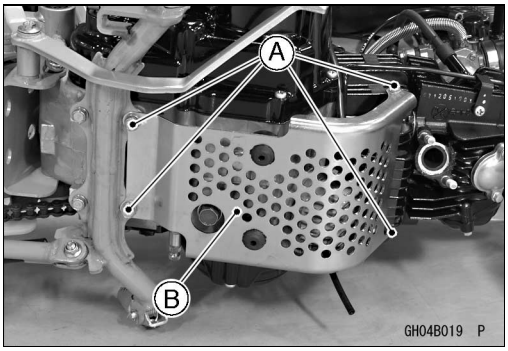
Right and Left Side Cover
Muffler [A]

Intake Pipe Bolts [A]
Spark Plug Cap [B]

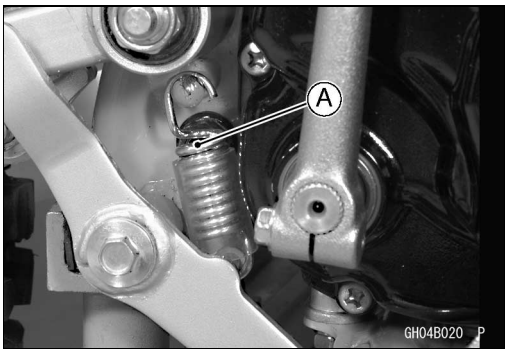


Engine Removal/Installation

- Remove the bolts [A] and the engine guard [B].

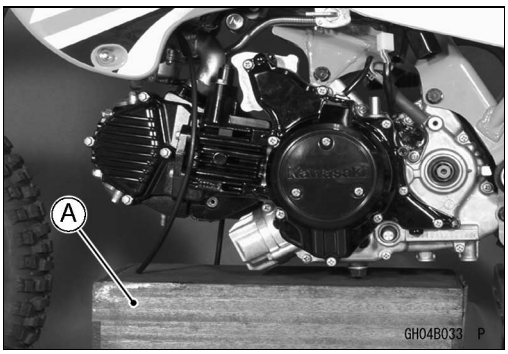


- Remove the brake pedal return spring [A].

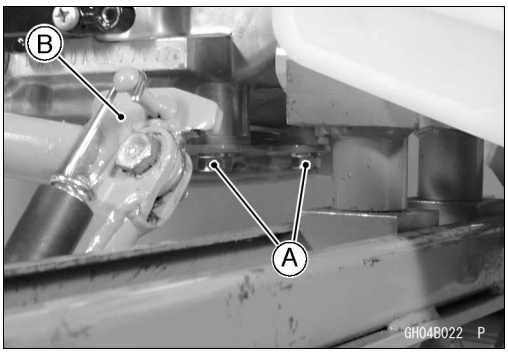


- Support the rear part of the frame on the jack [A].

- Support the engine with a suitable stand [A].

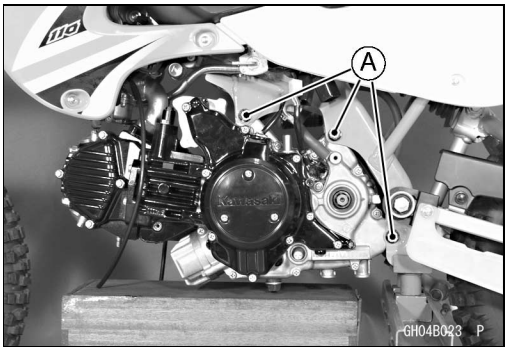


- Remove the bolts [A] and take off the front footpeg bracket [B] with side stand.



Engine Removal/Installation

- Remove the three engine mounting bolts [A] and dismount the engine.

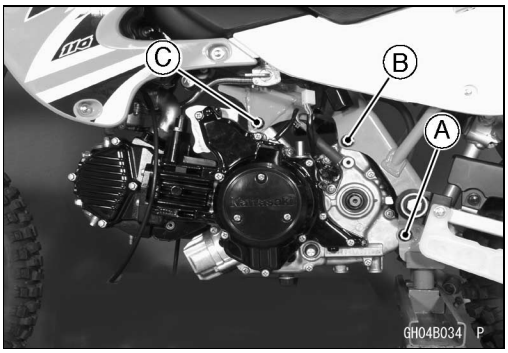


Engine Installation

- Support the engine with a suitable stand and set it at the correct position.
- Install the lower [A], middle [B] and upper [C] engine mounting bolts from left side of the engine.
- Tighten the engine mounting nuts.

Torque - Engine Mounting Nuts: 54 N·m (5.5 kgf·m, 40 ft·lb).

- Install the removed parts.
- Adjust the drive chain (see Final Drive chapter).



Crankshaft / Transmission

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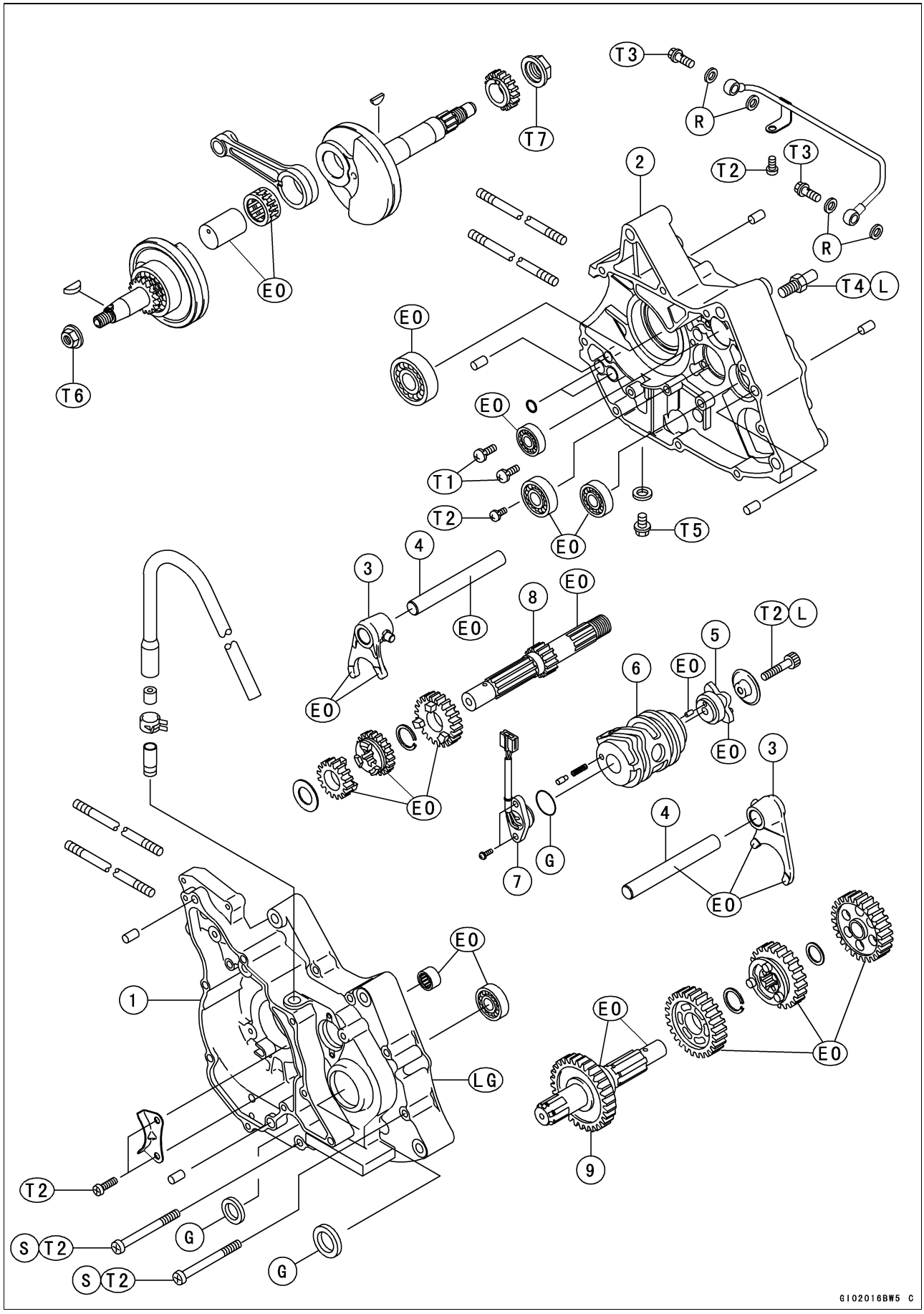
Exploded View



Exploded View

1. Left Crankcase Half
2. Right Crankcase Half
3. Shift Fork
4. Shift Rod
5. Shift Drum Cam
6. Shift Drum
7. Gear Position Switch
8. Drive Shaft
9. Output Shaft

EO: Apply engine oil.
G: Apply high-temperature grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
R: Replacement Parts.
S: Follow the specific tightening sequence.
T1: 2.9 N·m (0.3 kgf·m, 26 in·lb)
T2: 5.2 N·m (0.53 kgf·m, 46 in·lb)
T3: 15 N·m (1.5 kgf·m, 11 ft·lb)
T4: 22 N·m (2.2 kgf·m, 16 ft·lb)
T5: 29 N·m (3.0 kgf·m, 22 ft·lb)
T6: 41.5 N·m (4.25 kgf·m, 30.6 ft·lb)
T7: 72 N·m (7.3 kgf·m, 53 in·lb)

8-4 CRANKSHAFT / TRANSMISSION

Specifications

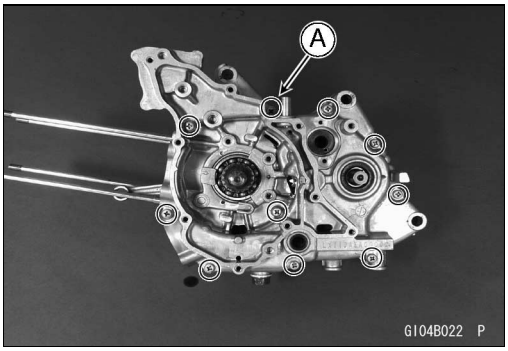
Item	Standard	Service Limit
Crankshaft, Connecting Rods:		
Connecting rod:		
Big end radial clearance	0.009 ~ 0.023 mm	0.07 mm
Big end side clearance	0.1 ~ 0.2 mm	0.4 mm
Crankshaft runout	Less than 0.03 mm TIR	0.08 mm
Transmission:		
Shift fork ear thickness	3.9 ~ 4.0 mm	3.8 mm
Gear shift fork groove width	4.05 ~ 4.15 mm	4.3 mm
Shift fork guide pin diameter	4.9 ~ 5.0 mm	4.8 mm
Shift drum groove width	5.05 ~ 5.20 mm	5.3 mm

Special Tools - Outside Circlip Pullers : 57001–144
Bearing Puller : 57001–158
Crankcase Splitting Tool Assembly : 57001–1098
Bearing Driver Set : 57001–1129
Crankshaft Jig : 57001–1174

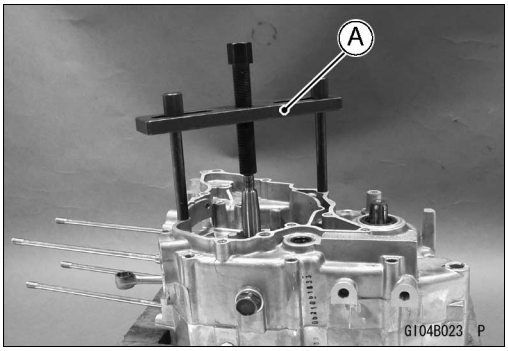
Sealant - Kawasaki Bond (Silicone Sealant): 56019–120
Kawasaki Bond (Liquid Gasket-Black): 92104–1003

Crankcase Splitting

Crankcase Splitting



- Remove the engine (see Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:
  Cylinder Head (see Engine Top End chapter)
  Cylinder (see Engine Top End chapter)
  Piston (see Engine Top End chapter)
  Clutch Cover (see Clutch chapter)
  Primary Clutch, Secondary Clutch (see Clutch chapter)
  Kick Shaft (see Clutch chapter)
  Oil Filter & Oil Pump (see Engine Lubrication System chapter)
  External Shift Mechanism (see Clutch chapter)
  Magneto Cover (see Electrical System chapter)
  Magneto Flywheel (see Electrical System chapter)
  Gear Position Switch
  Crankcase Screws [A]



- Using the crankcase splitting tool assembly [A], split the crankcase.

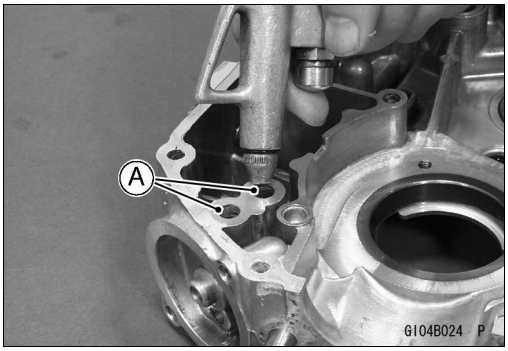
  Special Tool - Crankcase Splitting Tool Assembly: 57001–1098
- Once the crankcase is split, remove the crankcase splitting tool and separate the crankcase halves.
- Remove the crankshaft from the crankcase half using a press.

CAUTION

Do not remove the ball, needle bearings and the oil seals unless it is necessary. Removal may damage them.

- Press the remaining bearing out of the crankcase half if the bearing remains on the crankcase half.

Crankcase Assembly



CAUTION

Right and left crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

- Chip off the old gasket from the mating surfaces of the crankcase halves.
- Using compressed air, blow out the oil passages [A] in the crankcase halves and the crankshaft.
- With a high-flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.

⚠ WARNING

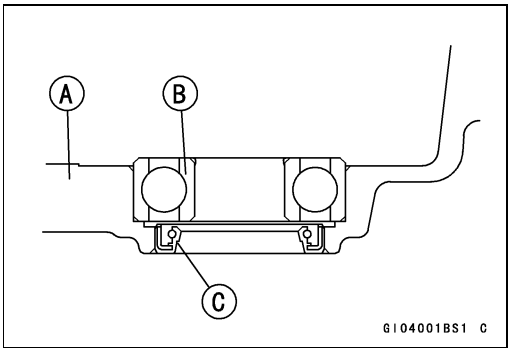
Clean the engine parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low-flash-point solvent to clean parts. A fire or explosion could result.

Crankcase Splitting

- Using a press and the bearing driver set, install new bearings until they bottoms out.
- ○ Press the output shaft bearing [B] in the left crankcase half [A].

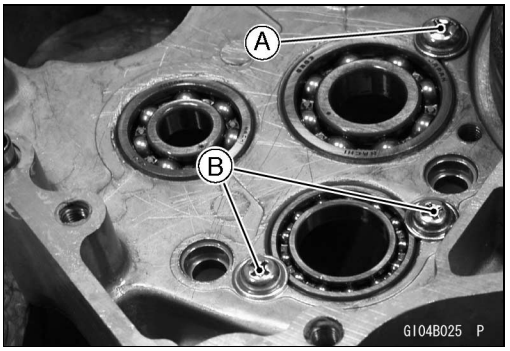
Special Tool - Bearing Driver Set: 57001–1129

- Apply high-temperature grease to the lips of the oil seals.
- Press in the oil seals [C] of the left crankcase half so that the seal surface is flush with the end of the hole.



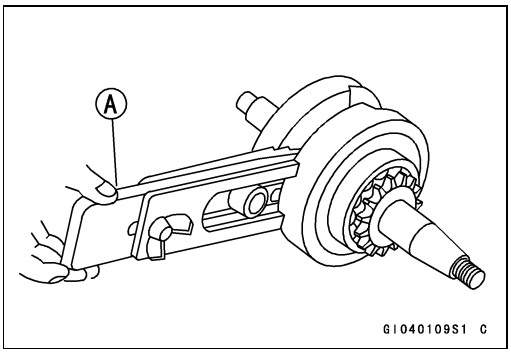
- Tighten the shift drum and drive shaft bearing retainer screws to the right crankcase.

Torque - Shift Drum Bearing Retainer Screws [B]: 2.9 N·m (0.3 kgf·m, 26 in·lb)
Drive Shaft Bearing Retainer Screw [A]: 5.2 N·m (0.53 kgf·m, 46 in·lb)

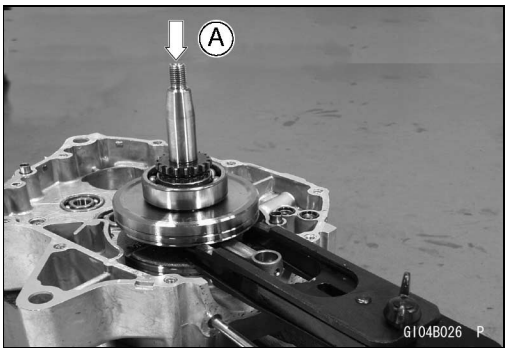


- Insert the crankshaft jig [A] between the crankshaft flywheels opposite the connecting rod big end to protect flywheel alignment. This tool is easily adjustable to fit in any gap between the flywheel.

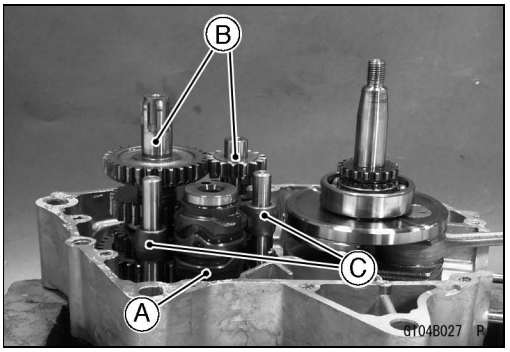
Special Tool - Crankshaft Jig: 57001–1174



- Fit the crankshaft into the right crankcase half using a press [A].

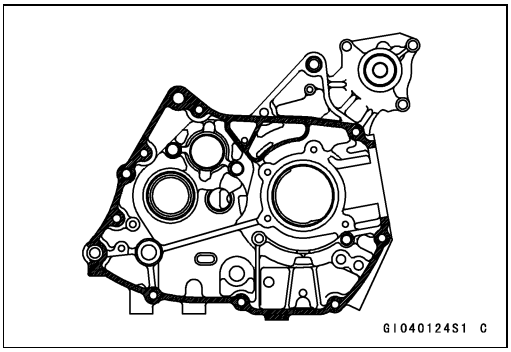


- Install:
  Shift Drum [A]
  Transmission Shaft Assemblies [B]
  Shift Forks [C]
- Check that the shift drum is in neutral position.

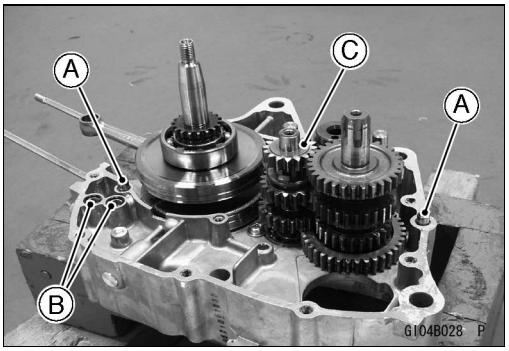


Crankcase Splitting

- Make sure that the mating surfaces of the crankcase halves are completely free of oil or contamination.
- Apply liquid gasket to the mating surface of the left crankcase half as shown.



- Check that two dowel pins [A], O-rings [B] and drive shaft spacer [C] in place.
- Fit the crankcase halves together hitting with a plastic hammer on the left crankcase side.



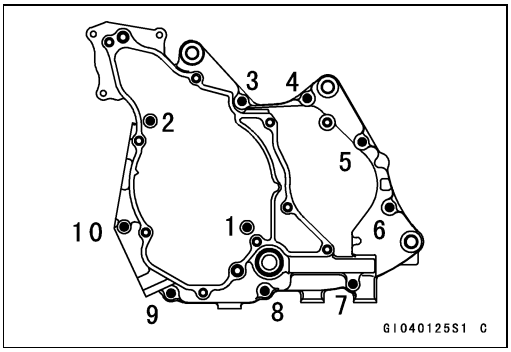
- Tighten the crankcase screws in that order shown.

NOTE

○ *Apply a non-permanent locking agent to the No.10 (tightening order) screw.*

Tightening Torque - Crankcase Screws: 5.2 N·m (0.53 kgf·m, 46 in·lb)

- Remove the crankcase installing jig.

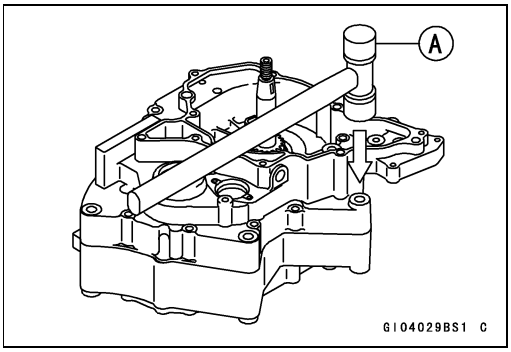


○ Check to see that the crankshaft, and output shaft all turn freely.

★If the crankshaft will not turn, it is probably not centered. Tap the mount portion of the crankcase with a plastic hammer [A] to reposition it. If it does not free up, split the crankcase again and find the cause.

★Spinning the output shaft, shift the transmission through all the gears to make certain there is not binding and that all the gears shift properly.

- Clean the cylinder and oil filter cap of the mating surface and wipe off the liquid gasket forced out.
- Install the removed parts.



Crankshaft, Connecting Rod

Crankshaft Disassembly and Assembly

CAUTION

Since assembly of the crankshaft demands exacting tolerance, the disassembly and reassembly of the crankshaft should only be performed by experienced mechanics with the necessary tools and equipment. The crankpin, connecting rod, and light crankshaft are available separately as spare parts, however it is recommended that the crankshaft assembly be replaced rather than attempting to replace the components.

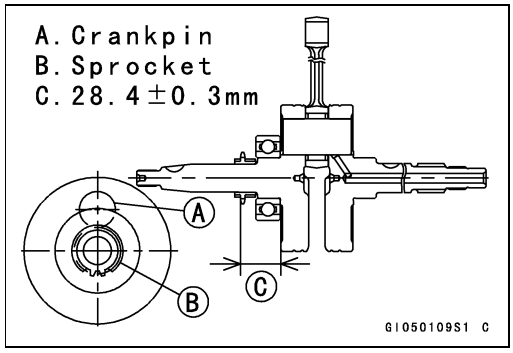
Disassembly

- If it should be necessary to disassemble the crankshaft.
- Remove the camshaft chain drive sprockets and bearing, using the bearing puller if the drive sprocket and bearing remains on the crankshaft.
- Use a press to remove the crankpin.
- Removal of the crankpin separates the flywheels, connecting rod, big end needle bearing, and crankpin.

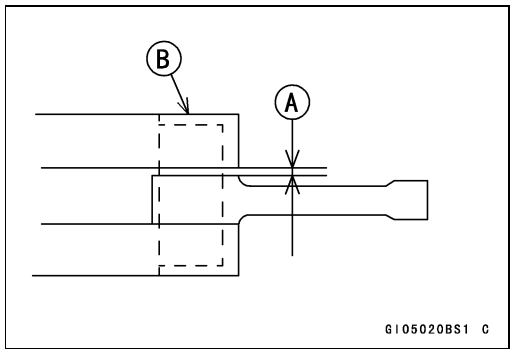
Special Tool - Bearing Puller: 57001–158

Assembly

- Press the bearing until it bottoms out.
- Press the camshaft chain drive sprocket on to the left flywheel as shown.



- Apply engine oil to the big end bearing.
- Press the crank halves onto the crankpin, noting the crankpin direction until connecting rod side clearance is within specification as shown.
  Side Clearance 0.1 ~ 0.2 mm [A]
  Crankpin Depth 0.8 ~ 1.2 mm [B]
- Check the following items after the crankshaft assembly.
  Connecting Rod Radial Clearance
  Connecting Rod Side Clearance
  Crankshaft Runout



Connecting Rod Big End Seizure

★ In the case of serious seizure with damaged flywheels, the crankshaft must be replaced.

★ In the case of less serious damage, disassemble the crankshaft and replace the crankpin, needle bearing, side washers, and connecting rod.

Crankshaft, Connecting Rod

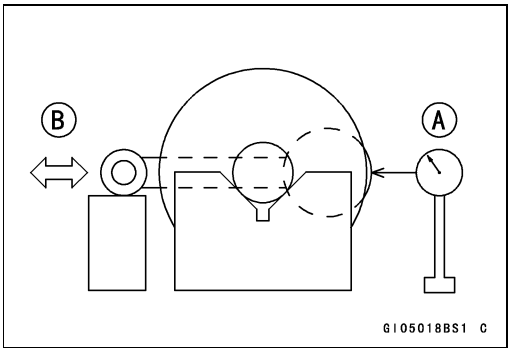
Connecting Rod Big End Radial Clearance

- Set the crankshaft in flywheel alignment jig or on V blocks, and place a dial gauge [A] against the big end of the connecting rod.
- Push [B] the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.

★If the radial clearance exceeds the service limit, the crankshaft should be either replaced or disassembled and the crankpin, needle bearing, and connecting rod big end examined for wear.

Connecting Rod Big End Radial Clearance

Standard:	**0.009 ∼ 0.023 mm**
Service Limit:	**0.07 mm**



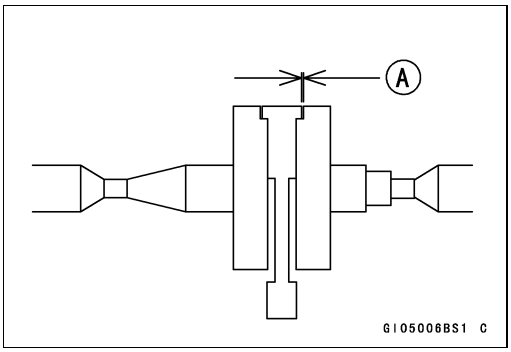
Connecting Rod Big End Side Clearance

- Measure the side clearance [A] of the connecting rod with a thickness gauge.

★If the clearance exceeds the service limit, replace the crankshaft.

Connecting Rod Big End Side Clearance

Standard:	**0.1 ∼ 0.2 mm**
Service Limit:	**0.4 mm**

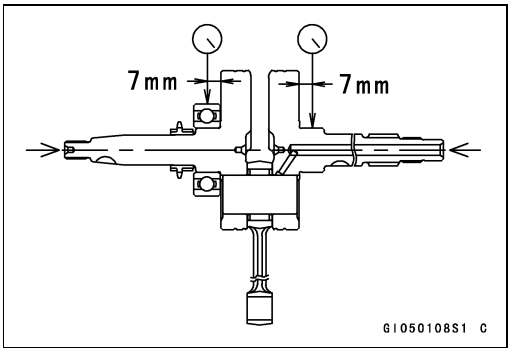


Crankshaft Runout

- Set the crankshaft in a flywheel alignment jig or on V blocks, and place a dial gauge against the points indicated.
- Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout.

Crankshaft Runout

Standard:	**Less than 0.03 mm TIR**
Service Limit:	**0.08 mm**

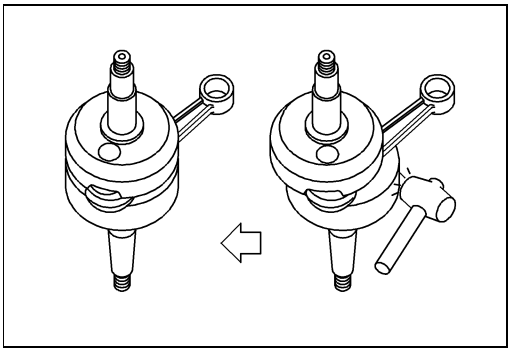


Crankshaft Alignment

★If the runout at either point exceeds the service limit, align the flywheels so that the runout falls within the service limit.

- In the case of horizontal misalignment, which is the most common, strike the projecting rim of the flywheel with a plastic, soft lead, or brass hammer as indicated in the figure.
- Recheck the runout with a dial gauge, repeating the process until the runout falls within the service limit.

○ Vertical misalignment is corrected either by driving a wedge in between the flywheels, or by squeezing the flywheel rims in a vise, depending on the nature of the misalignment.



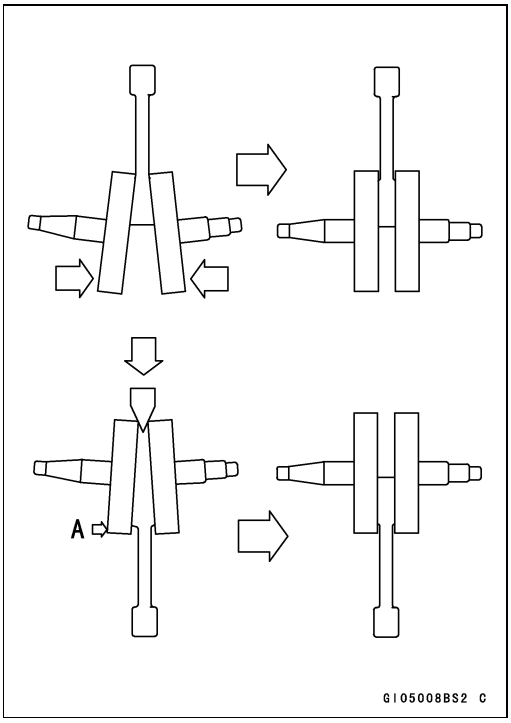
Crankshaft, Connecting Rod

- In the case of both horizontal and vertical misalignment, correct the horizontal misalignment first.
- Recheck big end side clearance after aligning crankshaft (see Connecting Rod Big End Side Clearance).

NOTE

○ *If crankshaft alignment cannot be corrected by the above method, replace the crankpin or crank halves as required. Recheck the runout and repeat the process until the runout is within service limit.*

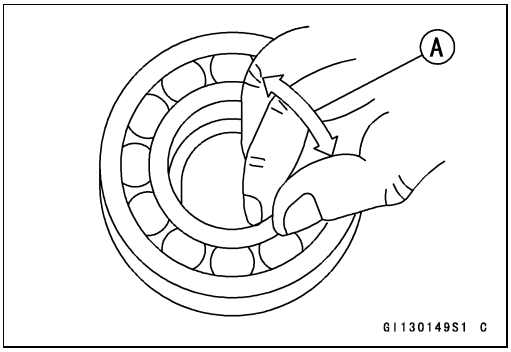
CAUTION
Don't hammer the flywheel at the point [A].



Crankshaft Main Bearing Wear

- Wash the bearings in high-flash-point solvent, blow them dry (DO NOT SPIN THEM), and lubricate them with engine oil.
- Turn each bearing [A] over by hand and see that it makes no noise, turns smoothly and has no rough spots.

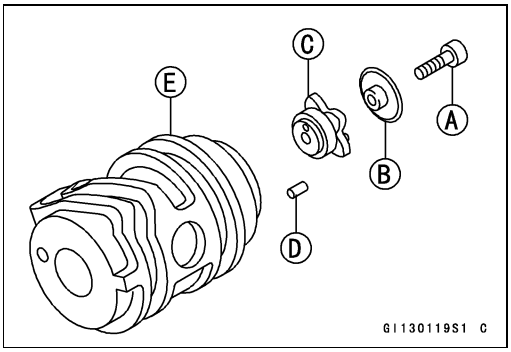
★If any of the bearings are defective, replace them.



Transmission

Transmission and Shift Mechanism Removal

- Split the crankcase.
- Pull out the shift rods and take out the shift forks.
- Remove the drive and output shaft assemblies as a set.
- Holding the shift drum with suitable bar, unscrew the shift drum Allen bolt [A].
- Remove the cam holder [B], shift drum cam [C] and dowel pin [D].
- Remove the shift drum [E].



Transmission Disassembly

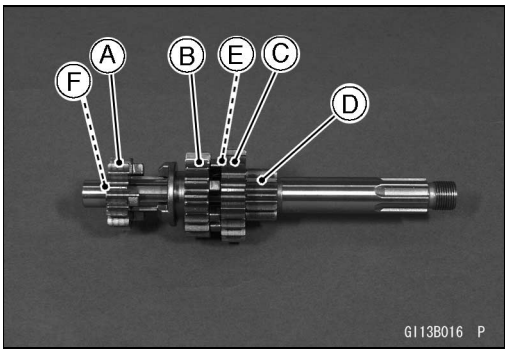
- Remove the transmission shafts.
- Using the circlip pliers to remove the circlip, disassemble the transmission shaft.

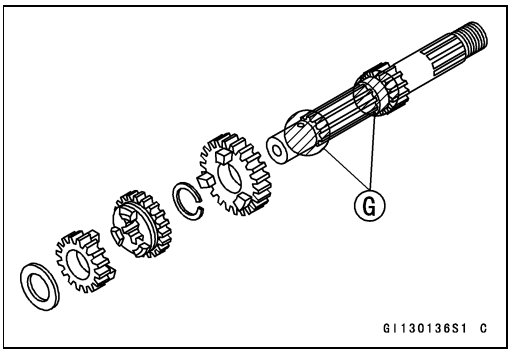
Special Tool - Outside Circlip Pliers: 57001–144

Transmission Assembly

- Assemble the transmission gears as shown.
- ○ Replace the old circlip with a new one if it is removed.
- ○ The drive shaft gears can be identified by size; the smallest diameter gear is 1st gear, and the largest it 4th (not working). Be sure that all parts are put back in the correct sequence, facing the proper direction, and that the circlip and the washer are properly in place.

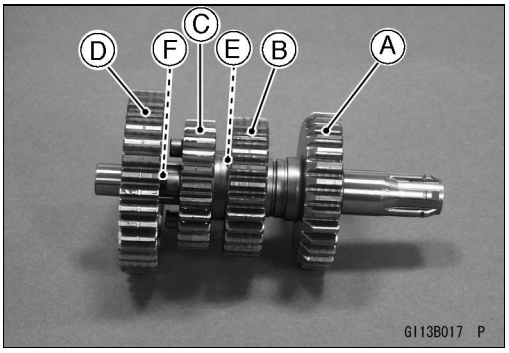
  2nd Gear [A]
  3rd Gear [B]
  4th Gear (not working) [C]
  1st Gear [D]
  Circlip [E]
  Shim [F]
  Apply Engine Oil [G]





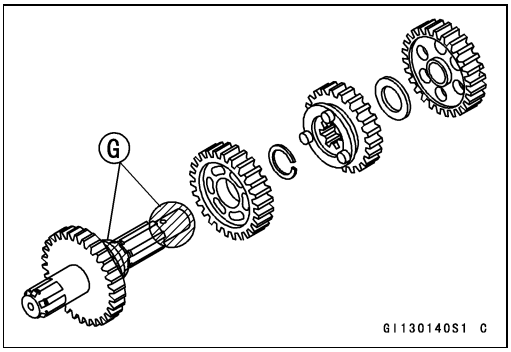
- ○ The output shaft gears can be identified by size; the largest diameter gear is 1st gear, and the smallest is 4th (not working). Be sure that all parts are put back in the correct sequence and facing the proper direction, and that the circlip is properly in place.

  2nd Gear [A]
  3rd Gear [B]
  4th Gear (not working) [C]
  1st Gear [D]
  Circlip [E]
  Spacer [F]

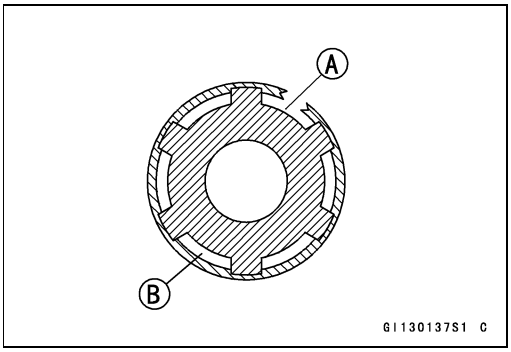


Transmission

Apply Engine Oil [G]



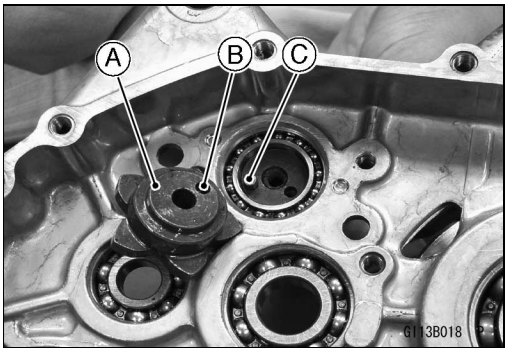
○ Always install circlips so that the opening is aligned with a spline groove. To install a circlip without damage, first fit the circlip onto the shaft expanding it just enough to install it, and then use a suitable gear to push the circlip into place.
[A] Opening of Circlip
[B] Groove of Shaft Spline



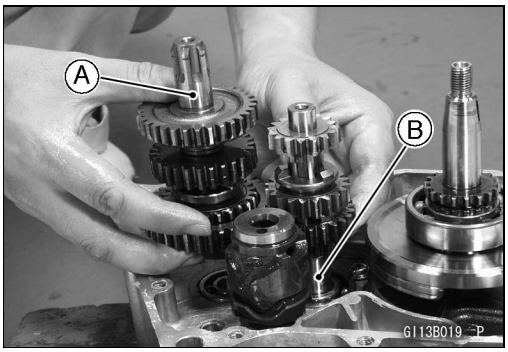
Transmission and Shift Mechanism Installation

- Fit the shift drum to the right crankcase half.
- Install the shift drum cam [A] aligning its hole [B] with the dowel pin [C].
- Install the holder and tighten the Allen bolt.

Torque - Shift Drum Allen Bolt: 5.2 N·m (0.53 kgf·m, 46 in·lb)



- Apply a clean engine oil to the transmission gears, bearings, and shaft journal, and fit the output [A] and drive shaft [B] assemblies as a set into the right crankcase half.
- Set the shift drum in neutral position.

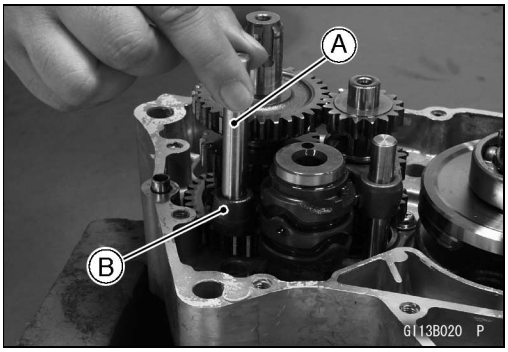


- Apply a clean engine oil to the shift fork fingers, and fit each shift fork into its gear-groove so that the shift fork guide pin is in the proper shift drum-groove.

NOTE

○ *Fingers of the 1st/3rd shift fork are longer than the fingers of the 2nd/4th shift fork.*

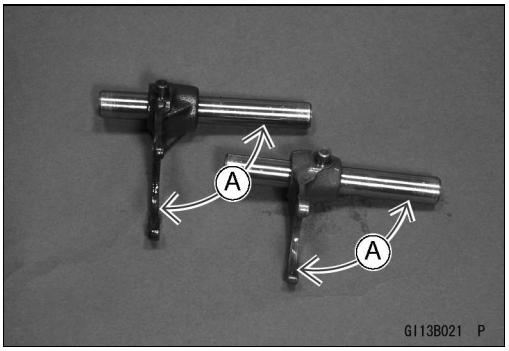
- Apply a clean engine oil to the shift rods [A], and insert each rod running it through each shift fork [B].
- Set the shift drum in neutral position, that is, drive and output shaft turn freely.
- Assemble the crankcase.



Transmission

Shift Fork Bending

● Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
[A] 90°



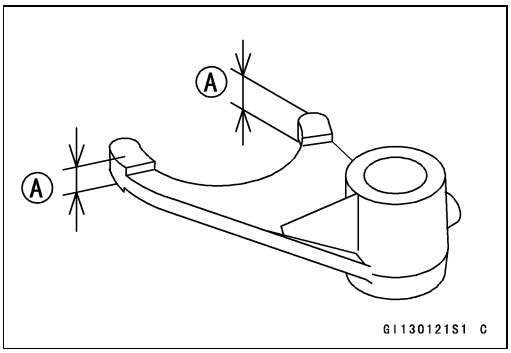
Shift Fork Ear/Gear Shift Fork Groove Wear

● Measure the thickness [A] of the shift fork ears.

★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

Shift Fork Ear Thickness

Standard:	**3.9 ∼ 4.0 mm**
Service Limit:	**3.8 mm**

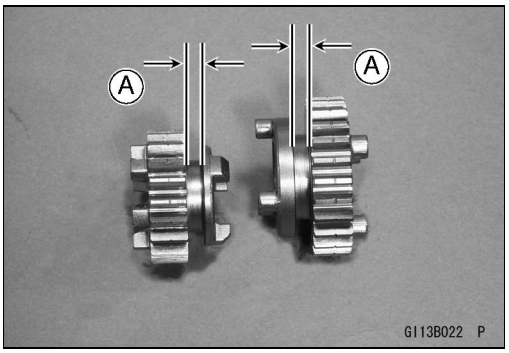


● Measure the width [A] of the gear shift fork grooves in the transmission gears.

★If a gear shift fork groove is worn over the service limit, the gear must be replaced.

Gear Shift Fork Groove Width

Standard:	**4.05 ∼ 4.15 mm**
Service Limit:	**4.3 mm**



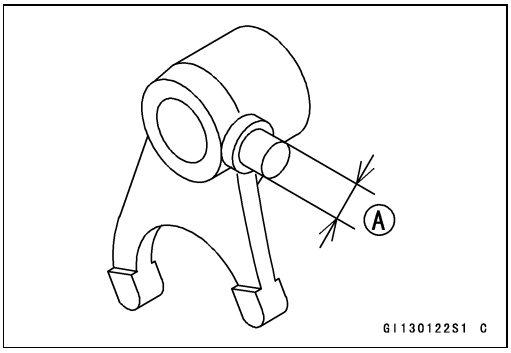
Shift Fork Guide Pin/Shift Drum Groove Wear

● Measure the diameter [A] of each shift fork guide pin, and measure the width [B] of each shift drum groove.

★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter

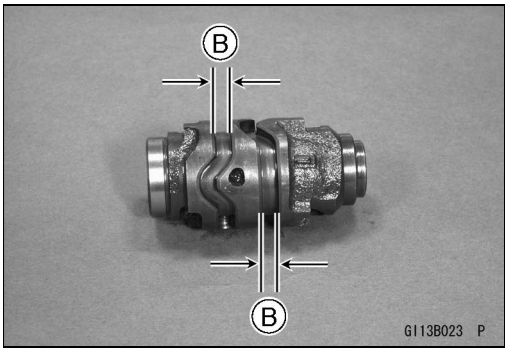
Standard:	**4.9 ∼ 5.0 mm**
Service Limit:	**4.8 mm**



★If any shift drum groove is worn over the service limit, the drum must be replaced.

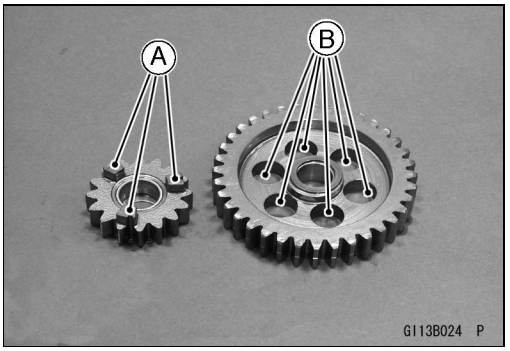
Shift Drum Groove Width

Standard:	**5.05 ∼ 5.20 mm**
Service Limit:	**5.3 mm**



Transmission

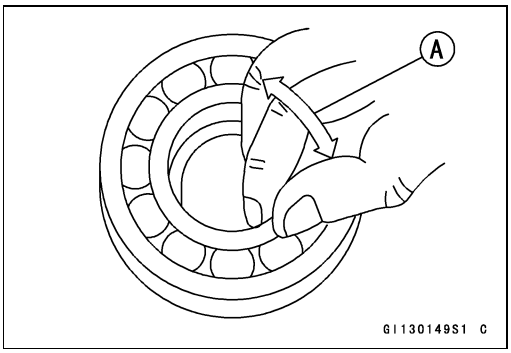
Gear Dog/Gear Dog Hole Damage



- Visually inspect the gear dogs [A] and gear dog holes [B].

★Replace any damaged gears or gears with excessively worn dogs or dog holes.

Ball and Needle Bearing Wear



CAUTION

Do not remove the bearings for inspection. Remove may damage them.

- Check the ball bearings.

○ Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high-flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.

○ Spin [A] a bearings by hand to check its condition.

★If the bearings are noisy, do not spin smoothly, or have any rough spots, replace them.

- Check the needle bearing.

○ The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If it is any doubt as to the condition of a needle bearing, replace it.

Oil Seal Inspection

- Inspect the oil seals.

★Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

Wheels / Tires

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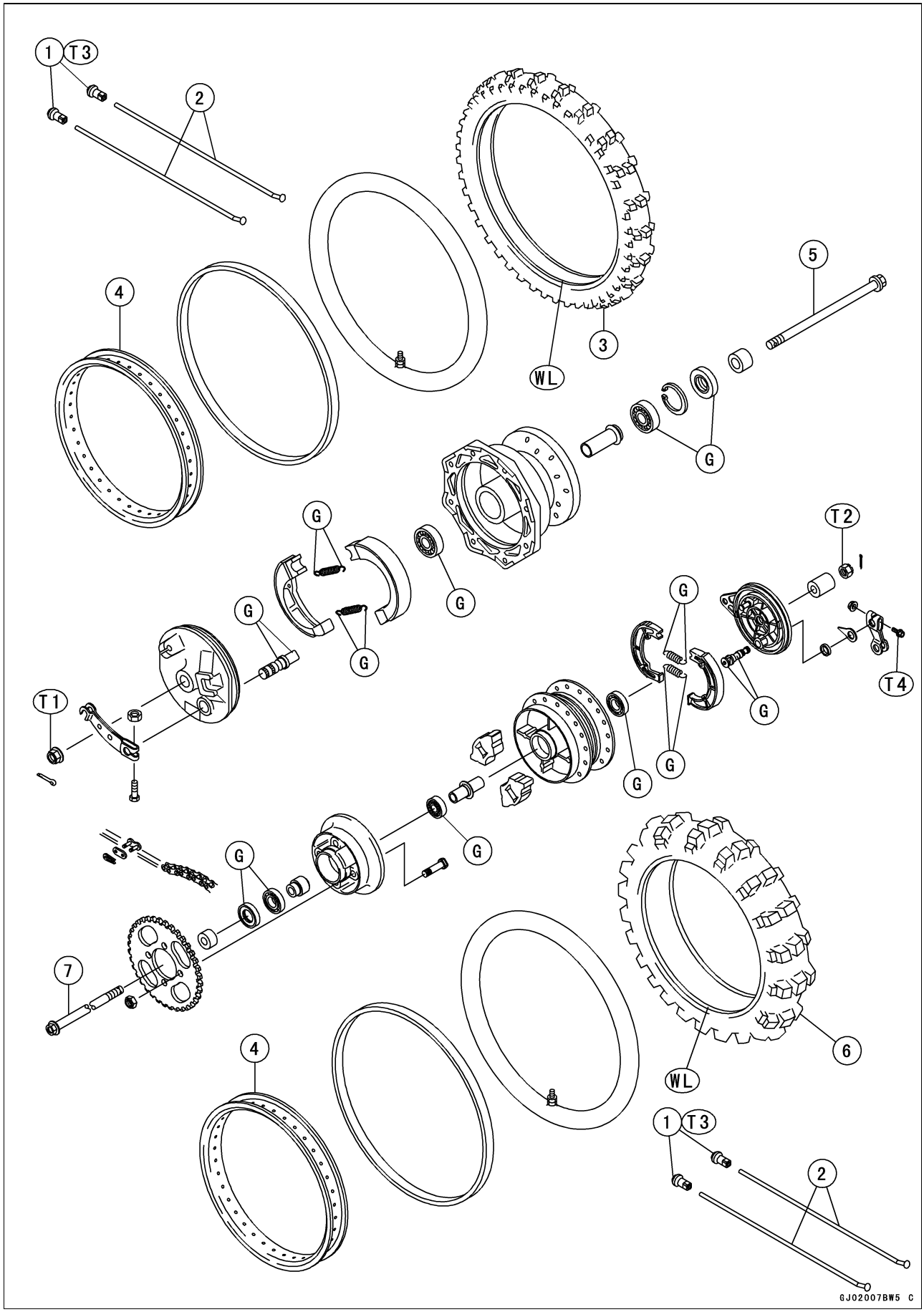
Exploded View



Exploded View

1. Nipple
2. Spoke
3. Front Tire
4. Rim
5. Front Axle
6. Rear Tire
7. Rear Axle

G: Apply high-temperature grease.
WL: Apply soap and water solution or rubber lubricant.
T1: 44 N·m (4.5 kgf·m, 32 ft·lb)
T2: 64 N·m (6.5 kgf·m, 47 ft·lb)
T3: 1.2 N·m (0.12 kgf·m, 10 in·lb)
T4: 7 N·m (0.7 kgf·m, 60 in·lb)

9-4 WHEELS / TIRES

Specifications

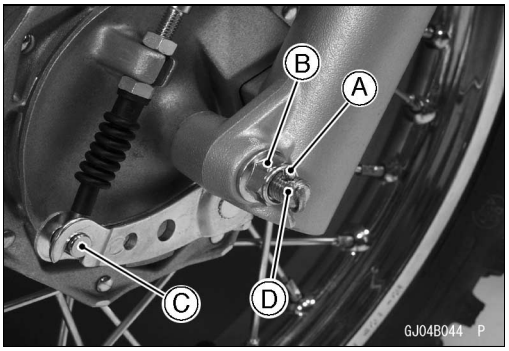
Item		Standard	Service Limit
Wheels:			
Rim runout:	Axial	0.5 mm or less	2 mm
	Radial	0.8 mm or less	2 mm
Axle runout/100 mm (Rear: 110 mm)		0.1 mm	0.2 mm
Tires:			
Standard tire:			- - -
Front:	Size	2.50-14 4PR	- - -
	Make	CHENG SHIN	- - -
	Type	C803	- - -
Rear:	Size	3.00-12 4PR	- - -
	Make	CHENG SHIN	- - -
	Type	C803	- - -
Tire air pressure:	Front	100 kPa (1.0 kgf/cm^2, 14 psi)	- - -
	Rear	100 kPa (1.0 kgf/cm^2, 14 psi)	- - -

Special Tools - Bearing Driver Set: 57001–1129
Jack: 57001–1238
Bead Breaker Assembly: 57001–1072
Rim Protector: 57001–1063
Tire Iron Protection of the Bead Bracker Assembly:57001–1072
Bearing Remover Shaft ϕ9: 57001–1265
Bearing Remover Head ϕ10 $\times$ ϕ12: 57001–1266

Wheels (Rims)

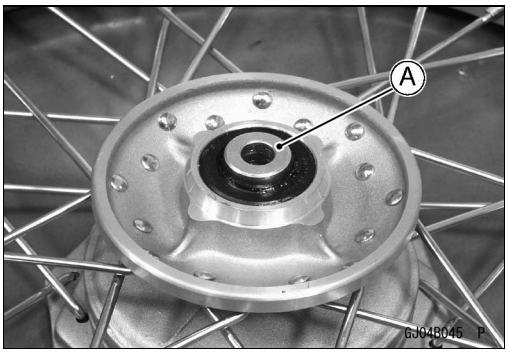
Front Wheel Removal

- Remove:
  Cotter Pin [A]
  Front Axle Nut [B]
- Using a jack, raise the front wheel off the ground.
- Remove:
  Front Brake Cable End [C]
  Front Axle [D]
  Front Wheel
  Front Brake Panel
  Collar

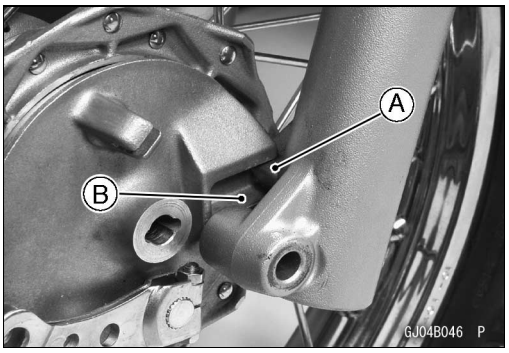


Front Wheel Installation

- Apply high-temperature grease to the grease seal.
- Install the collar [A] on the right side of the hub.



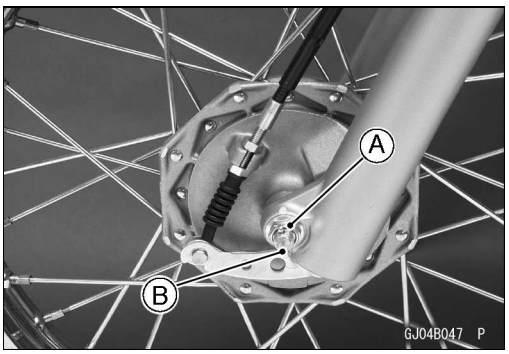
- Fit the tongue [B] on the fork leg into the groove [A] on the front brake panel.



- Tighten the front axle nut [A].

  Torque - Front Axle Nut : 44 N·m (4.5 kgf·m, 32 ft·lb)

- Install the cotter pin [B] through the front axle nut to front axle and spread its ends.
- Install the front brake cable and adjust it.

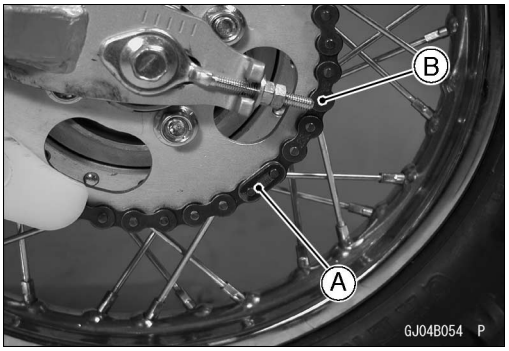


Rear Wheel Removal

- Using the jack under the frame so that the rear wheel is raised off the ground.

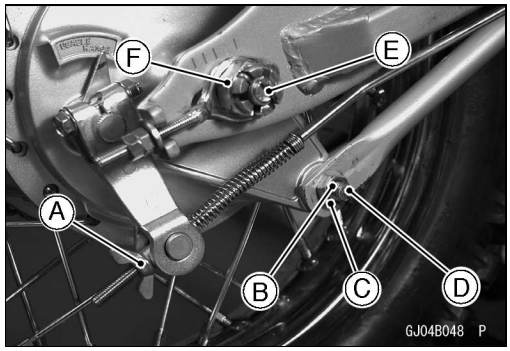
  Special Tool - Jack: 57001–1238

- Remove the clip [A] from the master link using pliers, and free the drive chain [B] from the rear sprocket.



Wheels (Rims)

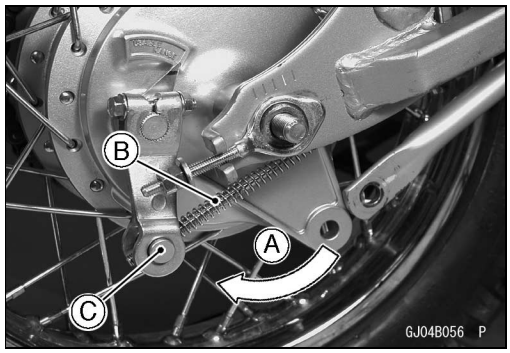
- Remove:
  Adjusting Nut [A]
  Cotter Pin [B]
  Rear Torque Link Nut [C]
  Rear Torque Link Bolt [D]
  Cotter Pin [E]
  Rear Axle Nut [F]



CAUTION

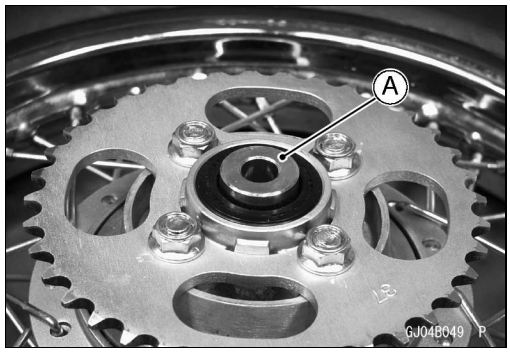
Do not depress the brake pedal deeply with the brake rod inserted into the brake cam lever joint, this may elongate the spring beyond its allowable spring extension.

- To remove the brake rod end from the brake cam lever, first turn the brake panel clockwise [A] as far as it will go, then depress the brake pedal lightly, the brake rod [B] will be separated from the brake cam lever joint [C].
- Pull out the rear axle and remove the rear wheel from the rear wheel coupling and from the motorcycle.



Rear Wheel Installation

- Apply high-temperature grease to the grease seal.
- Install the collar [A] on the left and right of the rear hub.
- Install the rear wheel.
- Install the drive chain.
- Adjust the drive chain slack (see Final Drive chapter).
- Turn the brake panel clockwise until the brake cam lever joint goes beyond the brake rod end then insert the brake rod end into the joint hole.



CAUTION

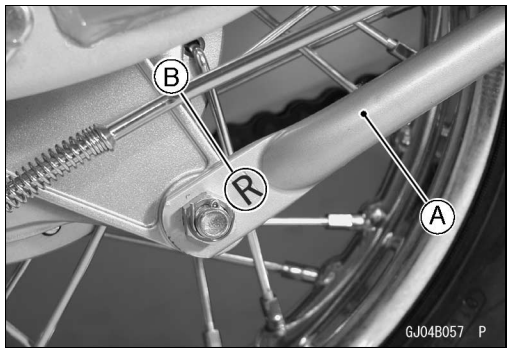
Do not insert the brake rod into the cam lever joint by depressing the brake pedal deeply, this will extend the brake spring beyond its allowable spring extension.

- Tighten the rear axle nut.

  Torque - Rear Axle Nut: 64 N·m (6.5 kgf·m, 47 ft·lb)

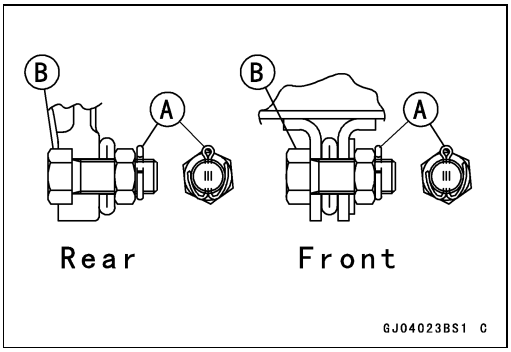
- Install the torque link [A] so that its “R” mark [B] faces rearward.
- Tighten the torque link nuts.

  Torque - Torque Link Nut: 25 N·m (2.5 kgf·m, 18 ft·lb)



Wheels (Rims)

- Insert the cotter pins [A] through the torque link bolts [B] and spread its ends.
- Insert the cotter pin through the axle nut to rear axle and spread its ends.
- Adjust:
  Drive Chain Slack (see Final Drive chapter)
  Brake Pedal Free Play (see Brakes chapter)



Wheels Inspection

- Place the jack under the frame so that the front/rear wheel is raised off the ground.

Special Tool - Jack: 57001–1238

- Spin the wheel lightly, and check for roughness or binding.
- If roughness or binding is found, replace the hub bearings.
- Visually inspect the front and rear axles for damage.
- If axle damaged or bent, replace it.

Spoke Tightness Inspection

○ Refer to Spoke Tightness Inspection in the Periodic Maintenance Chapter.

Rim Runout Inspection

○ Refer to Rim Runout Inspection in the Periodic Maintenance Chapter.

Axle Inspection

- Visually inspect the front and rear axle for damages.

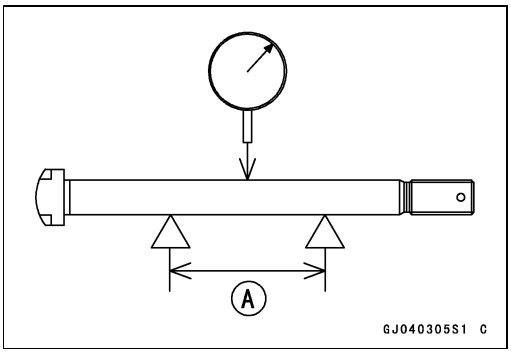
★If the axle is damaged or bent, replace it.

- Place the axle in V blocks that are 100 mm (Rear Axle: 110 mm) [A] apart, and set a dial gauge on the axle at a point halfway between the blocks.
- Turn the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.

★If runout exceeds the service limit, replace the axle.

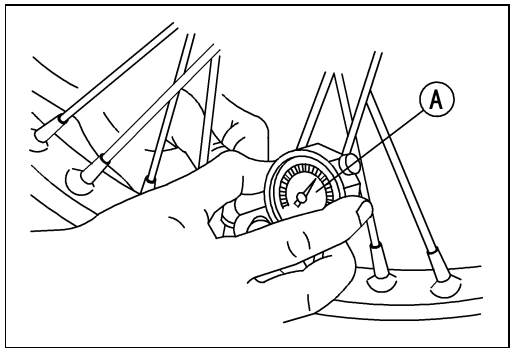
Axle Runout/100 mm (Rear Axle: 110 mm)

Standard:	**0.1 mm**
Service Limit:	**0.2 mm**



Tires

Air Pressure Inspection/Adjustment



- Remove the valve cap.
- Using tire air pressure gauge [A], measure the tire pressure when the tires are cold.

★Adjust the tire air pressure to suit track conditions and rider preference, but do not stray too far from the recommended pressure.

Track Condition	Tire Pressure
When the track is wet, muddy, sandy or slippery, reduce the tire pressure to increase the tire tread surface on the ground.	80 kPa (0.8 kg/cm^2, 11 psi) ↑
When the track is pebbly or hard, increase the tire pressure to prevent damage or punctures, through the tires will skid more easily.	↓ 100 kPa (1.0 kg/cm^2, 14 psi)

- Tighten the valve cap securely.

Tires Inspection

As the tire tread wears down, the tire becomes more susceptible the puncture and failure.

- Remove any imbedded stones or other foreign particles from the tread.
- Visually inspect the tire for cracks and cuts, replacing the tire in case of bad damage. Swelling or high spots indicate internal damage, requiring tire replacement.

⚠WARNING

To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

NOTE

○ *Check and balance the wheel when a tire is replaced with a new one.*

Standard Tire

Front:

Size: **2.50-14 4PR**

Make: **CHENG SHIN**

Type: **C803**

Rear:

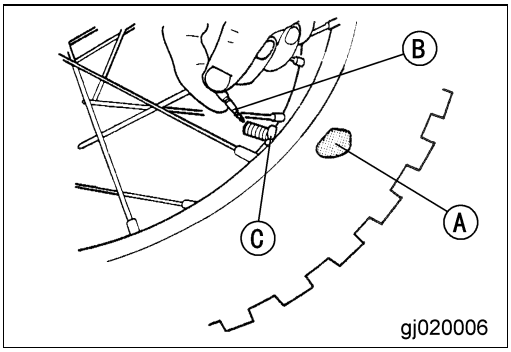
Size: **3.00-12 4PR**

Make: **CHENG SHIN**

Type: **C803**

Tires

Tire Removal



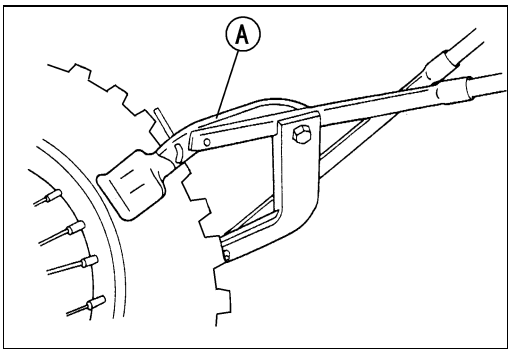
CAUTION

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so the disc does not touch the ground.

- Remove the wheel from the motorcycle (see Wheels Removal).
- To maintain wheel balance, mark [A] the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
- Take out the valve core [B] to let out the air.
- Remove the valve stem nut [C].
- ○ When handling the rim, be careful not to damage the rim flanges.
- Remove the bead protector nut.
- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

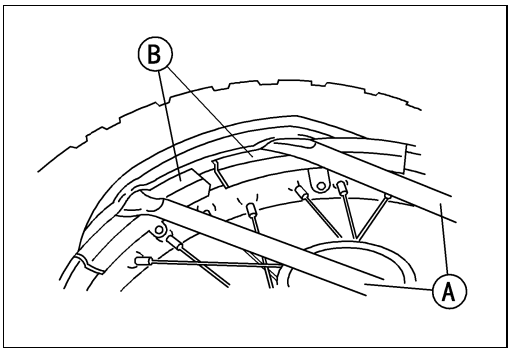
CAUTION

Never lubricate with mineral oil (engine oil) or gasoline because they will cause deterioration of the tire.



- Break the beads away from both sides of the rim with the bead breaker [A].

Special Tools - Bead Breaker Assembly: 57001–1072



- Step on the side of the tire opposite valve stem, pry the tire off the rim with the tire iron [A] of the bead breaker protecting the rim with rim protectors [B].

Special Tools - Rim Protector: 57001–1063
Tire Iron Protection of the Bead Breaker Assembly: 57001–1072

CAUTION

Take care not to inset the tire irons so deeply that the tube gets damaged.

- Remove the tube when one side of the tire is pried off.
- Pry the tire off the rim.

Tires

Tire Installation

- Inspect the rim and tire, and replace them if necessary.
- Install the tube.
- Apply a soap and water solution, or rubber lubricant to the rim flange and tire beads.
- Position the tire on the rim so that the valve [A] is at the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire. see Tire Removal).
- Insert the valve stem into the rim, and screw the nut on loosely.
- Fit the rim protectors and use tire irons to install the tire bead.

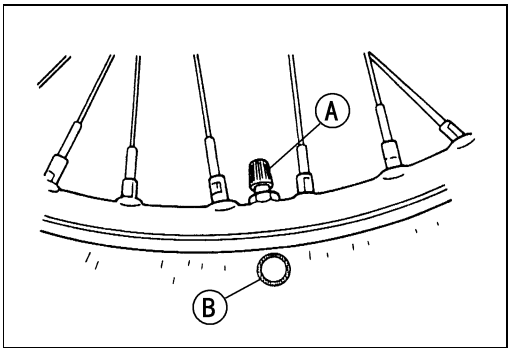
NOTE

○ *To prevent rim damage, be sure to place the rim protectors at any place the tire irons are applied.*

- Pry one side of the tire back onto the rim. Fit the bead protector into the tire.
- Pry the other side of the tire onto the rim, starting at the side opposite the valve.

○ Take care not to insert the tire irons so deeply that the tube is damaged.

- Install the other side of the tire bead onto the rim in the same manner.
- Check that the tube is not pinched between the tire and rim.
- Tighten the bead protector nut and valve stem nut, and put on the valve cap.
- Check and adjust the air pressure after installing.

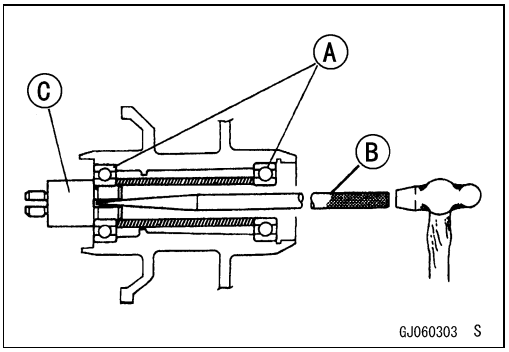


Hub Bearing

Hub Bearing Removal

- Remove the wheel.
- To remove the grease seals, pry out the grease seal using a screwdriver.
- Using the bearing remover shaft and bearing remover head, remove the hub bearings [A].

Special Tools - Bearing Remover Shaft, ϕ9: 57001–1265 [B]
Bearing Remover Head, ϕ10 X ϕ12: 57001–1266 [C]

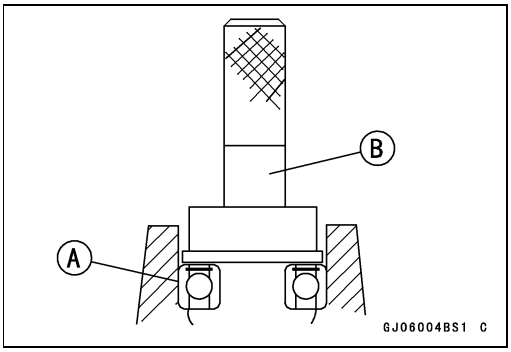


Hub Bearing Installation

- Before installing the hub bearings, blow any dirt or foreign particles out the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- Install the bearings [A] using the bearing driver set [B] so that the marked or shield sides face out.

○ Press in the bearings until they bottom out.

Special Tool - Bearing Driver Set: 57001–1129

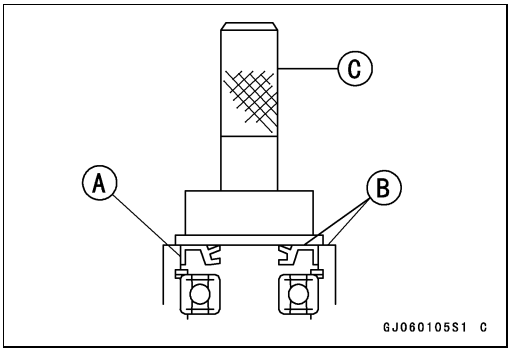


NOTE

○ *For correct tire alignment, the right bearing must be installed first rather than left bearing in both front and rear hubs.*

- Replace the grease seal [A] with new ones.
- Apply high-temperature grease to the grease seal lips.
- Press in the grease seal so that the seal surface is flush [B] with the end of the hole using the bearing driver set [C].

Special Tool - Bearing Driver Set: 57001–1129



Bearing Inspection

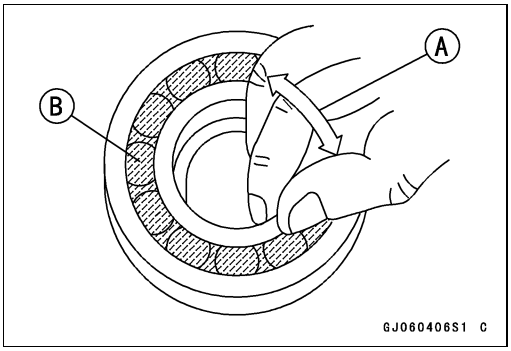
Since the hub bearings are made to extremely close tolerances, the clearance cannot normally be measured.

CAUTION

Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding. If bearing play, roughness, or binding is found, replace the bearing.
- Examine the bearing seal [B] for damage or leakage.

★If the seal is damaged or is leaking, replace the bearing.



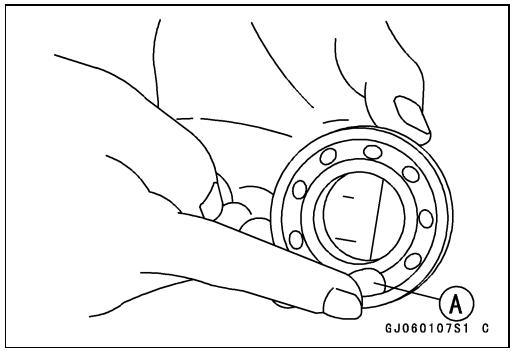
Hub Bearing

Bearing Lubrication

- Remove the hub bearings on the front and rear wheel hubs.
- Wash the bearings with a high-flash-point solvent, dry them (do not spin them while they are dry), and oil them.
- Spin each bearings by hand to check its condition.

★ If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.

- If the same bearing is to be used again, re-wash it with a high-flash-point solvent, and dry it.
- Pack each bearings with good quality bearing grease [A] before installation. Turn each bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the bearing housings on the wheel hub before bearing installation.
- Install the bearings.



Final Drive

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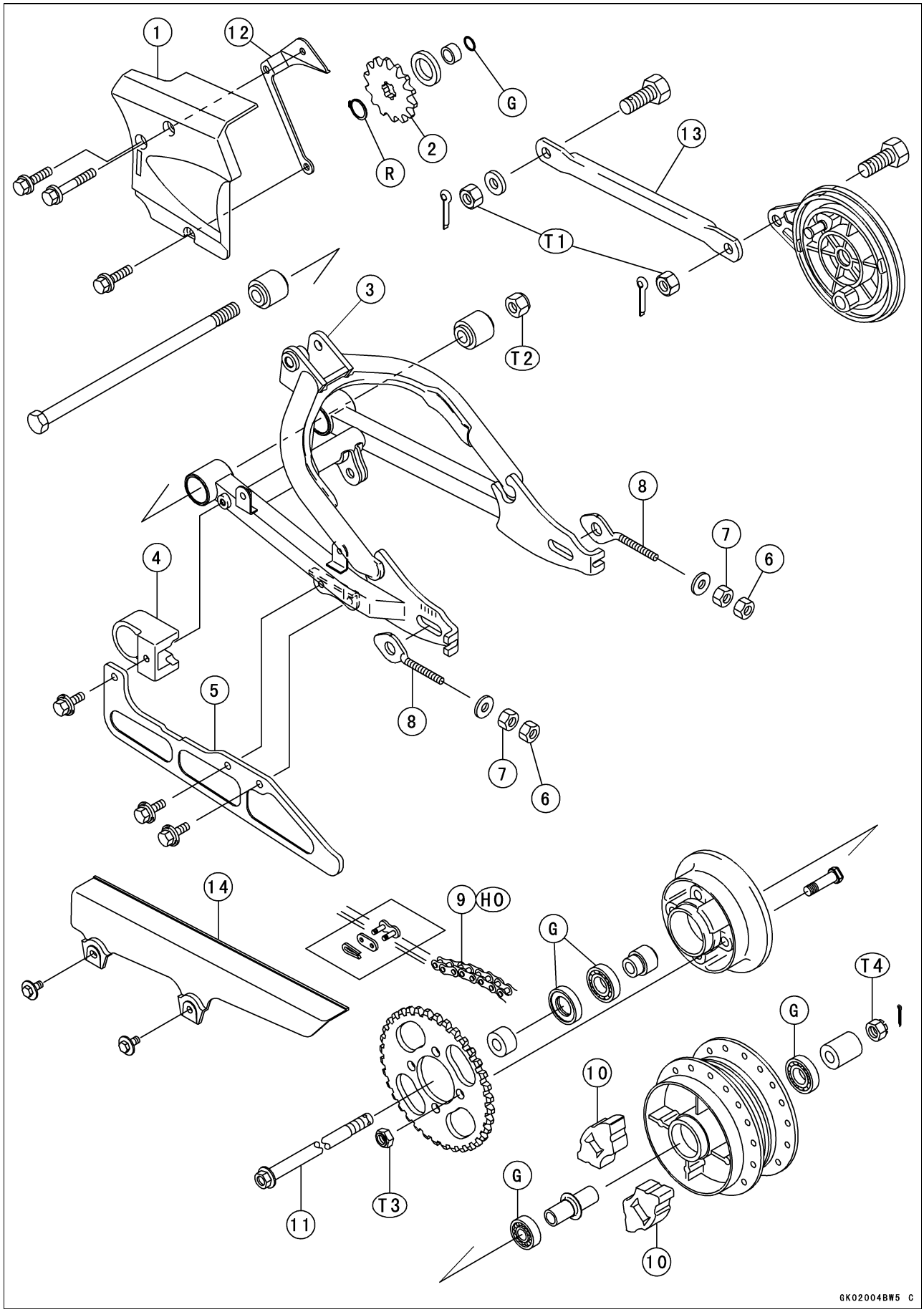
Exploded View



Exploded View

1. Engine Sprocket Cover
2. Engine Sprocket
3. Swingarm
4. Chain Slipper
5. Chain Guide
6. Locknut
7. Adjusting Nut
8. Chain Adjuster
9. Drive Chain
10. Coupling Damper
11. Rear Axle
12. Chain Tension Guide
13. Torque Link
14. Chain Cover

T1: 25 N·m (2.5 kgf·m, 18 ft·lb)
T2: 78 N·m (8.0 kgf·m, 58 ft·lb)
T3: 34 N·m (3.5 kgf·m, 25 ft·lb)
T4: 64 N·m (6.5 kgf·m, 47 ft·lb)
G: Apply high-temperature grease.
HO: Apply heavy oil.
R: Replacement part

10-4 FINAL DRIVE

Specifications

Item	Standard	Service Limit:
Drive Chain:		
Make/type	DID 420MBK1	- - -
	88 links	
Drive chain slack	0 ∼ 5 mm	- - -
20 link length	254.0 ∼ 254.6 mm	259 mm
Sprocket:		
Engine sprocket diameter	49.1 ∼ 49.3 mm	48.4 mm
Rear sprocket diameter	141.76 ∼ 142.26 mm	141.5 mm
Rear sprocket warp	Less than 0.4 mm	0.5 mm

Special Tools - Outside Circlip Pliers: 57001–144
Bearing Driver Set: 57001–1129

Drive Chain

Chain Slack Inspection

○ Refer to Chain Slack Inspection in the Periodic Maintenance Chapter.

Chain Slack Adjustment

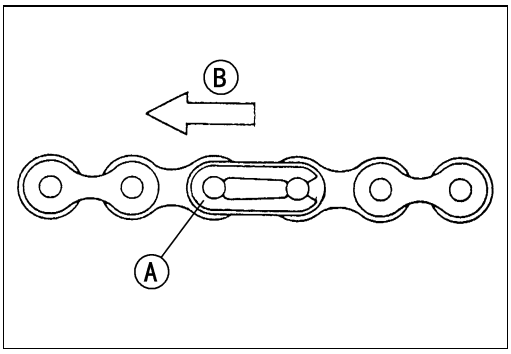
○ Refer to Chain Slack Adjustment in the Periodic Maintenance Chapter.

Drive Chain Removal

- Remove:
  Drive Chain Cover
  Engine Sprocket Cover
- Remove the clip from the drive chain master link using pliers and remove the master link.
- Free the drive chain from the sprockets, being careful that the chain does not get dirty from contact with the ground.

Drive Chain Installation

- The direction of the master link clip [A] must be as shown.
  [B] Direction of Drive Chain Rotation

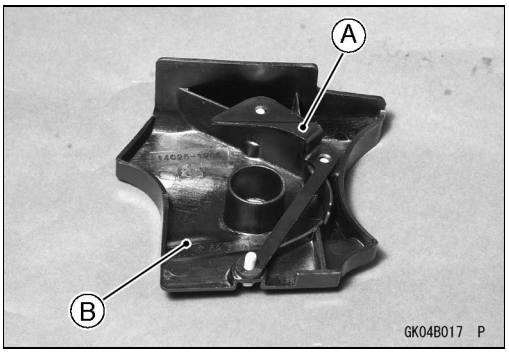


⚠WARNING

Incorrect installation of the master link clip can allow it to catch on an adjacent part. If the clip dislodges, the chain could come a part, and this could result in rear wheel lockup and loss of control.

- Adjust the chain slack.

- Put the chain tension guide [A] on the engine sprocket cover [B], and install the sprocket cover.



Chain Wear Inspection

○ Refer to Chain Wear Inspection in the Periodic Maintenance Chapter.

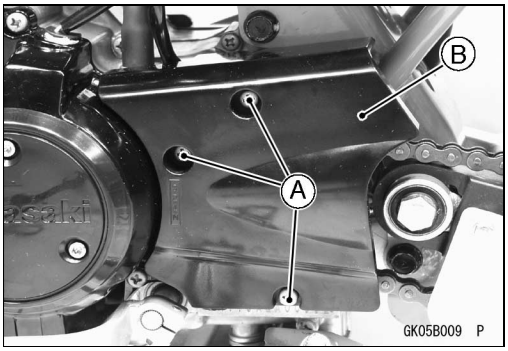
Chain Lubrication

○ Refer to Chain Lubrication in the Periodic Maintenance Chapter.

Sprockets, Coupling

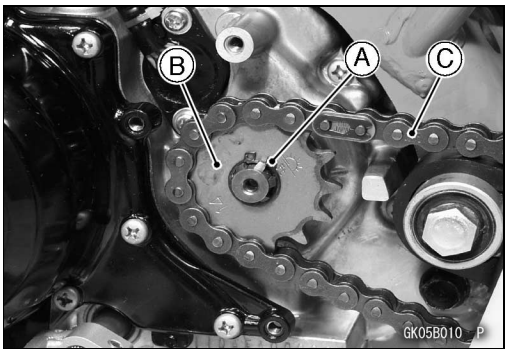
Engine Sprocket Removal

● Remove:
Bolts [A]
Engine Sprocket Cover [B]



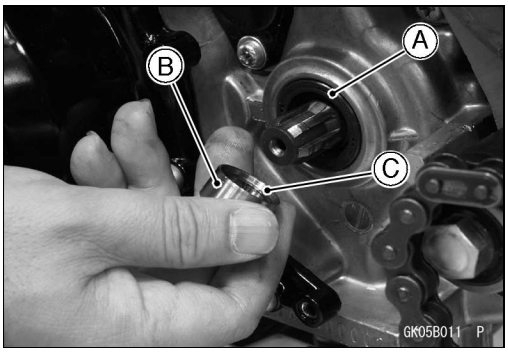
● Remove the circlip [A] and take off the sprocket [B] with drive chain [C].
● Pull the collar and O-ring off the output shaft.

Special Tool - Outside Circlip Pliers: 57001–144

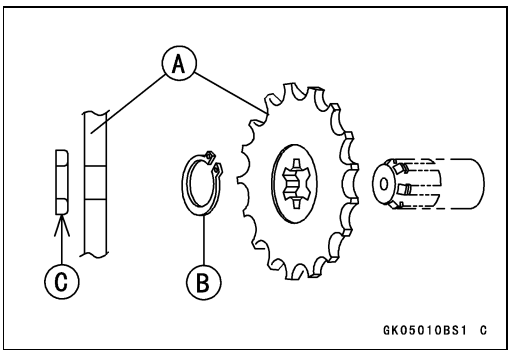


Engine Sprocket Installation

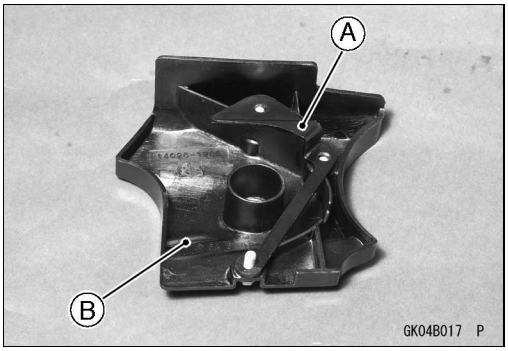
● Apply high-temperature grease to the O-ring.
● Install the O-ring [A] and collar [B] to the output shaft.
○ The chamfered side [C] of the collar must be faced in.



● Install the engine sprocket [A] and drive chain together.
● Fit the circlip [B] with the round side facing [C] in as shown.
● Adjust the drive chain slack if necessary.



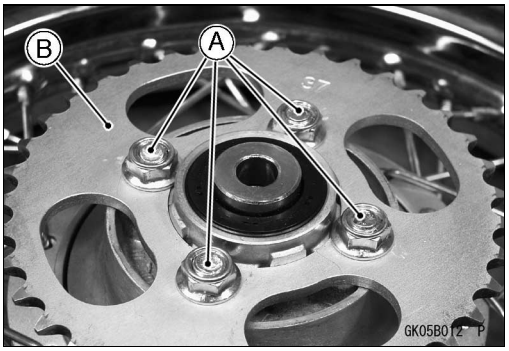
● Put the chain tension guide [A] on the engine sprocket cover [B], and install the sprocket cover.



Sprockets, Coupling

Rear Sprocket Removal

- Remove the rear wheel (see Wheels/Tires chapter).
- Unscrew the rear sprocket bolts [A], and remove the rear sprocket [B].

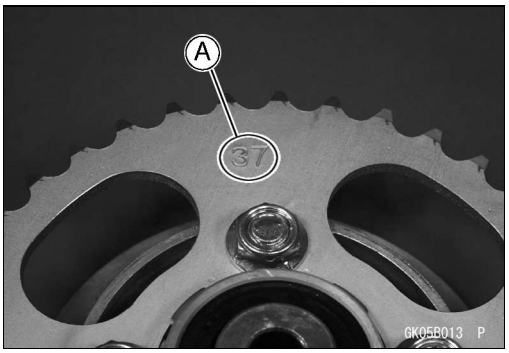


Rear Sprocket Installation

- Install the rear sprocket facing the tooth number making [A] outward.
- Tighten the rear sprocket nuts.

Tightening Torque - Rear Sprocket Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Install the rear wheel.



Sprocket Wear Inspection

○ Refer to Sprocket Wear Inspection in the Periodic Maintenance Chapter.

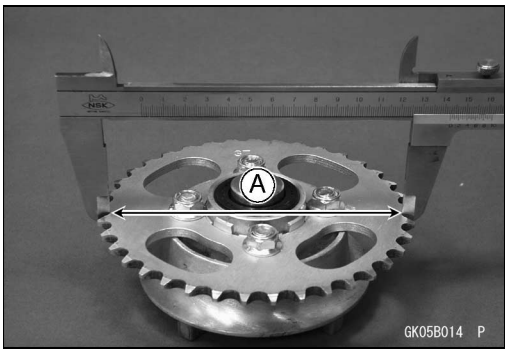
Sprocket Diameter Inspection

- Measure the diameter [A] of the sprocket at the base of the tooth.

★If the sprocket is worn down to less than the service limit, replace the sprocket.

Sprocket Diameter

	Engine Sprocket	Rear Sprocket
Standard:	**49.1 ∼ 49.3 mm**	**141.76 ∼ 142.26 mm**
Service Limit:	**48.4 mm**	**141.5 mm**



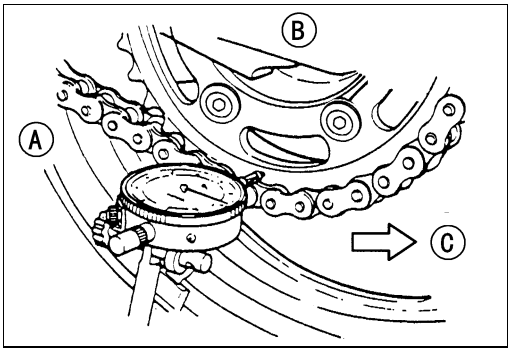
Rear Sprocket Warp Inspection

- Raise the rear wheel so that it will turn freely, and set a dial gauge [A] against the rear sprocket [B] near the teeth as shown in the figure.
- Rotate [C] the rear wheel, and read the dial gauge. The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

★If the runout exceeds the service limit, replace the rear sprocket.

Rear Sprocket Warp

Standard:	**Less than 0.4 mm**
Service Limit:	**0.5 mm**

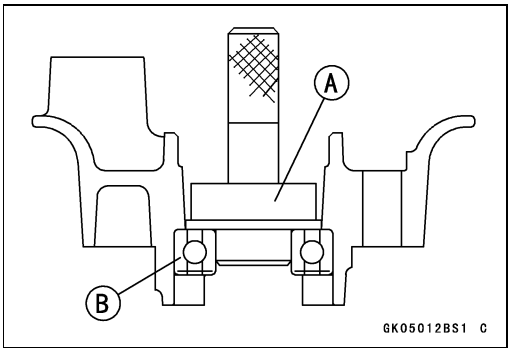


Sprockets, Coupling

Coupling Bearing Removal

- Pull out the coupling collar from the left.
- Remove the oil seal.
- Using the bearing driver set [A] or some other suitable tool, remove the bearing [B] by tapping from the drum side.

Special Tools - Bearing Driver Set: 57001–1129



Coupling Bearing Installation

- Inspect the bearing, and replace it if necessary.
- Press in the bearing so that the marked side faces out until it is bottomed.
- Replace the oil seal with a new one.
- Press in the oil seal so that the seal surface is flush with the end of the hole.

○ Apply high-temperature grease to the oil seal lips.

Special Tool - Bearing Driver Set: 57001–1129

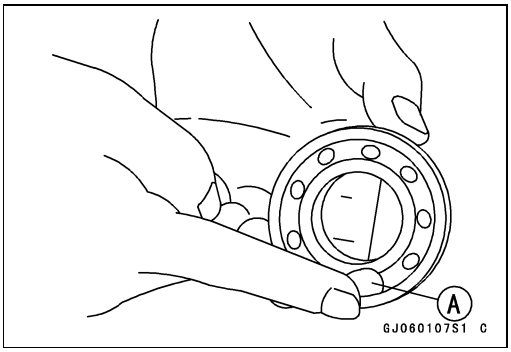
Coupling Bearing Inspection and Lubrication

Since the coupling bearing is made to extremely close tolerances, the clearance cannot normally be measured.

- Wash the bearing with a high-flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition.

★ If it is noisy, doesn't spin smoothly, or has any rough sports, it must be replaced.

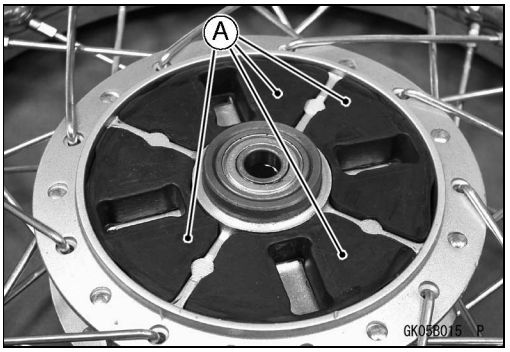
- If the bearing is to be used again, rewash it with a high-flash-point solvent, dry it, and pack it with good quality bearing grease. Turn the bearing around by hand a few times to make sure the grease [A] is distributed uniformly inside the bearing, and wipe the old grease out of the coupling before bearing installation.



Coupling Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber dampers [A].

★ Replace the dampers if they appear damaged or deteriorated.



Brakes

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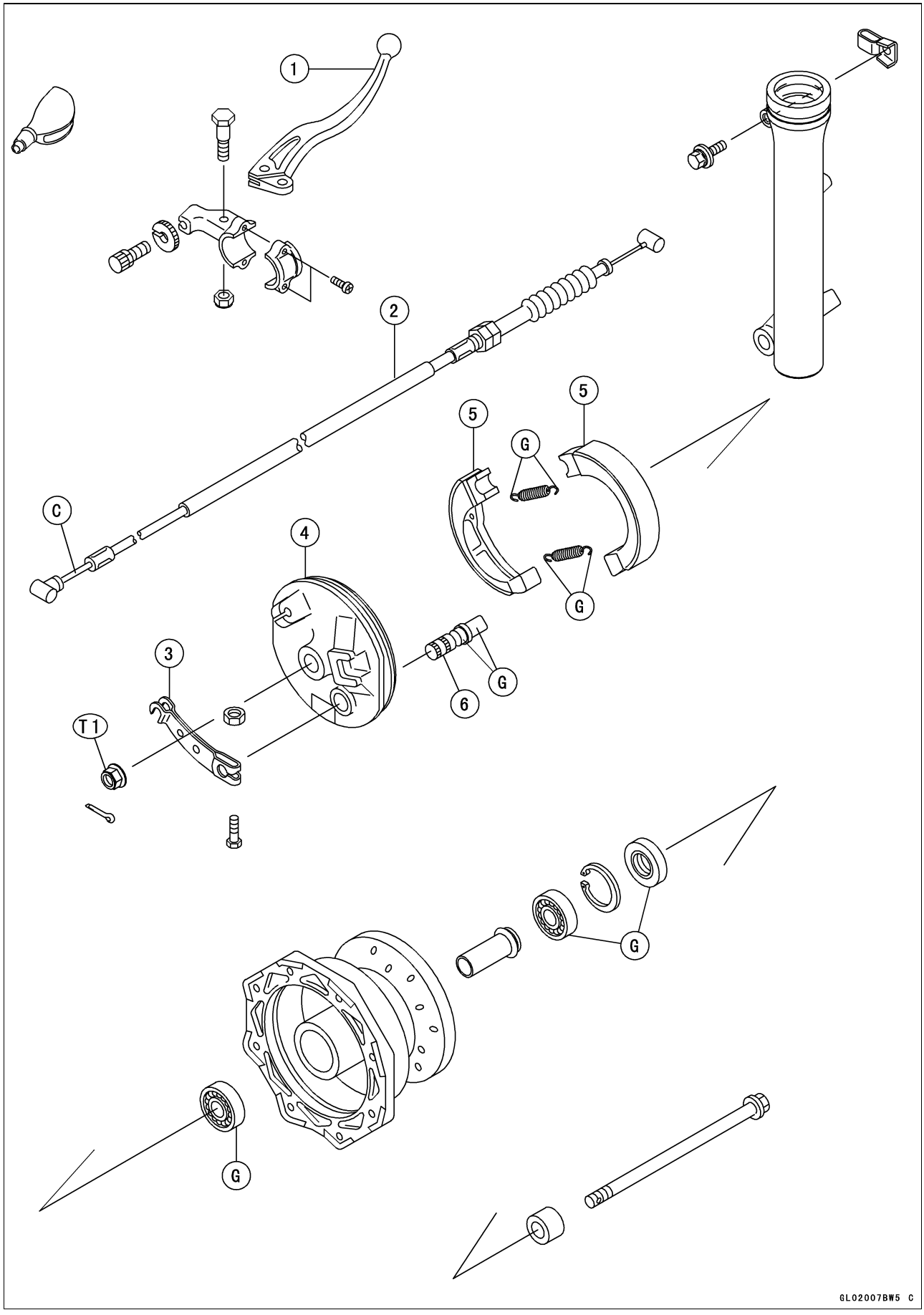
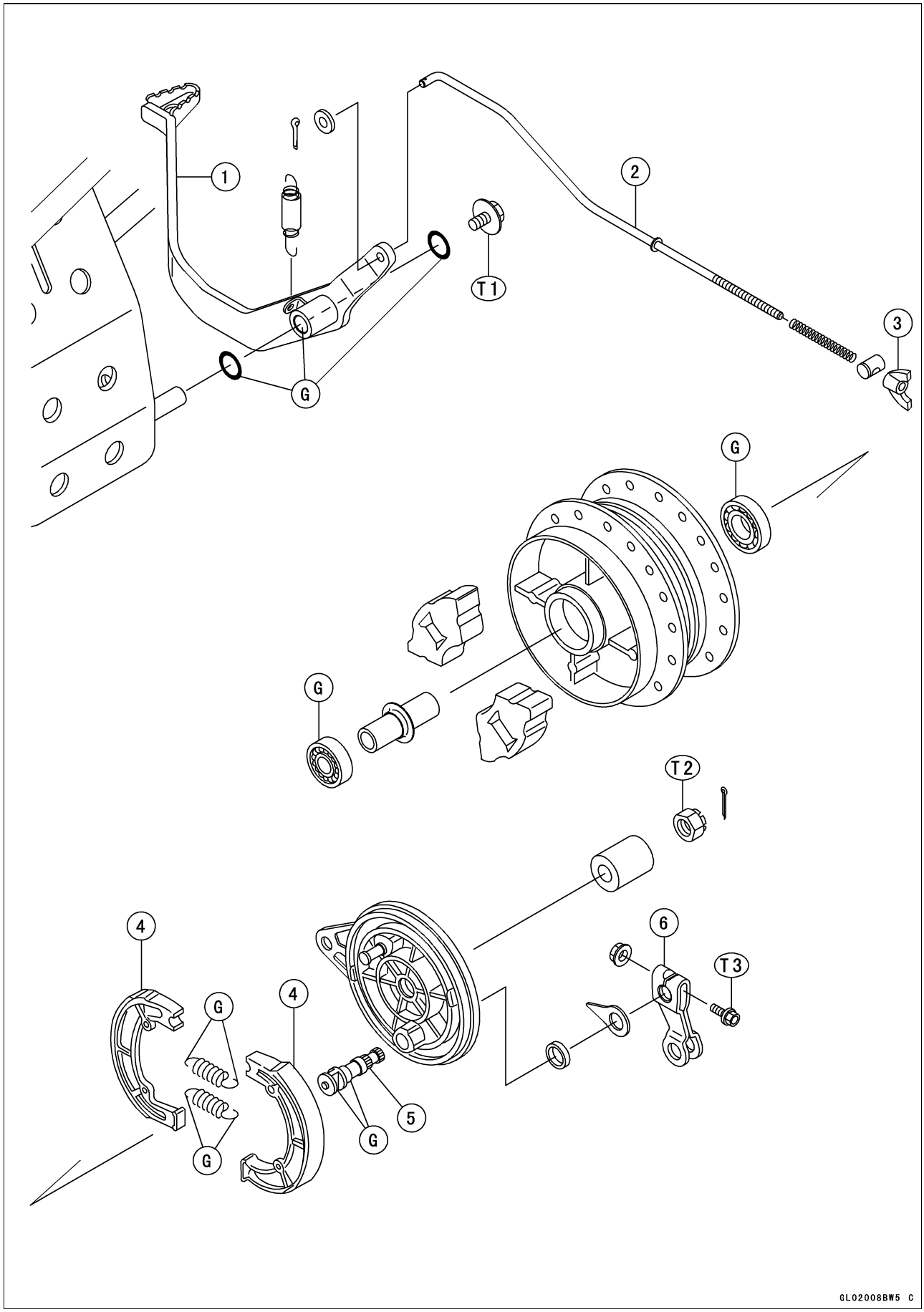
Exploded View



Exploded View

C: Apply cable lubricant.
G: Apply grease.
T1: 44 N·m (4.5 kgf·m, 32 ft·lb)
1. Brake Lever
2. Brake Cable
3. Cam Lever
4. Brake Panel
5. Brake Shoe
6. Camshaft

Exploded View



Exploded View

1. Brake Pedal
2. Brake Lod
3. Adjusting Nut
4. Brake Shoe
5. Camshaft
6. Cam Lever

G: Apply grease.
T1: 8.8 N·m (0.9 kgf·m 79 in·lb)
T2: 64 N·m (6.5 kgf·m, 47 ft·lb)
T3: 7 N·m (0.7 kgf·m, 60 in·lb)

Specifications

Item		Standard	Service Limit
Brake Lever and Pedal:			
Brake lever free play		4 ~ 5 mm	- - -
Brake pedal free play		20 ~ 30 mm	- - -
Brake Drum, Brake Shoes:			
Shoe lining thickness			
	Front	2.10 ~ 3.00 mm	1.2 mm
	Rear	3.85 ~ 4.15 mm	2.0 mm
Shoe spring free length			
	Front	30.8 ~ 31.2 mm	32.6 mm
	Rear	32.5 mm	34.1 mm
Drum inside diameter			
	Front	90.000 ~ 90.087 mm	90.75 mm
	Rear	110.000 ~ 110.087 mm	110.75 mm
Camshaft diameter			
	Front	11.957 ~ 11.984 mm	11.88 mm
	Rear	14.957 ~ 14.984 mm	14.88 mm
Camshaft hole inside diameter			
	Front	12.000 ~ 12.027 mm	12.15 mm
	Rear	15.000 ~ 15.027 mm	15.15 mm
Cam lever angle		80° ~ 90°	- - -

Special Tool - Inside Circlip Pliers: 57001–143

Brake Lever, Brake Pedal

Brake Lever, Brake Pedal Free Play Inspection

○ Refer to Brake Lever, Brake Pedal Free Play Inspection in the Periodic Maintenance Chapter.

Front Brake Free Play Adjustment

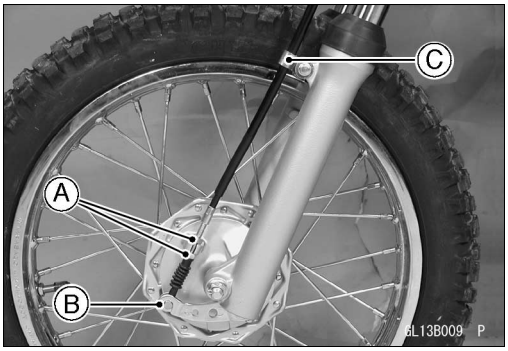
○ Refer to Front Brake Free Play Adjustment in the Periodic Maintenance Chapter.

Brake Pedal Free Play Adjustment

○ Refer to Brake Pedal Free Play Adjustment in the Periodic Maintenance Chapter.

Brake Cable Removal

● Free the brake cable from the brake lever.
● Remove:
  Front Brake Adjusting Nuts [A]
  Brake Cable Lower End [B]
  Front Brake Cable Guide Clamp [C]
● Pull the brake cable out of the frame.



Brake Cable Installation

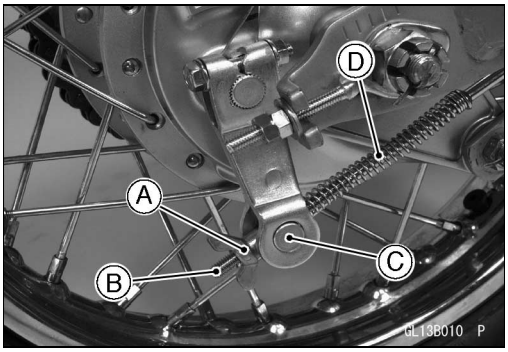
● Run the brake cable according to the Cable, Wire, and Hose Routing Section of the General Information chapter.
● Adjust the brake lever free play.

Brake Cable Lubrication

● Whenever the cable is removed, or in accordance with the Periodic Maintenance Chart, lubricate the brake cable. Refer to General Lubrication in the Periodic Maintenance Chapter.
○ Apply a thin coating of grease to the cable upper end.
○ Use a commercially available pressure cable lubricator to lubricate the cable.
○ With the cable disconnected at both ends, the cable should move freely in the cable housing.

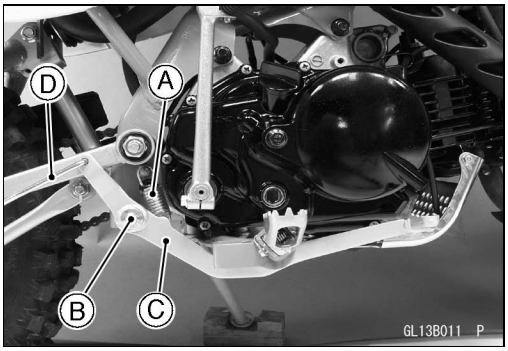
Brake Pedal and Rod Removal

● Remove:
  Rear Brake Adjusting Nut [A]
  Brake Rod [B]
  Brake Cam Lever Joint [C]
  Spring [D]

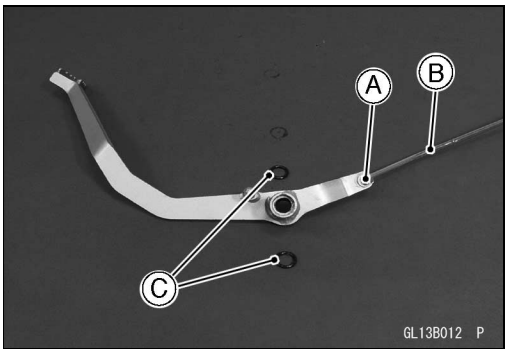


Brake Lever, Brake Pedal

Brake Pedal Return Spring [A]
Brake Pedal Mounting Bolt [B]
Brake Pedal [C] with Rod [D]

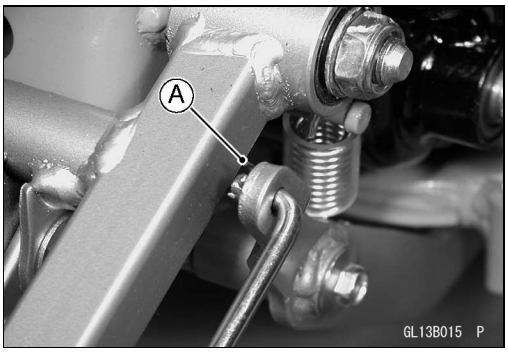


Cotter Pin [A]
Washer [B]
O-rings [C]



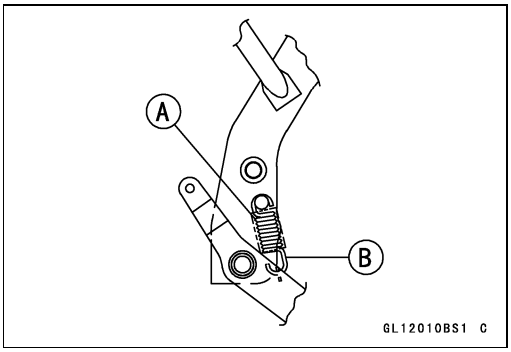
Brake Pedal and Rod Installation

- Brake pedal and rod installation is the reverse of removal.
- Bend the cotter pin [A] securely on both side as shown.



- Apply a multi purpose grease to the pedal pivot and O-rings.
- Before installing the brake pedal, set in the return spring each end to the brake pedal.
  - Install the return spring [A] so that its long hook portion [B] faces downward.
- Tighten the brake pedal mounting bolt.

  Torque - Brake Pedal Mounting Bolt: 8.8 N·m (0.9 kgf·m, 79 in·lb)
- Adjust the brake pedal free play.



Brake Panel and Drum

Brake Lining Wear Inspection

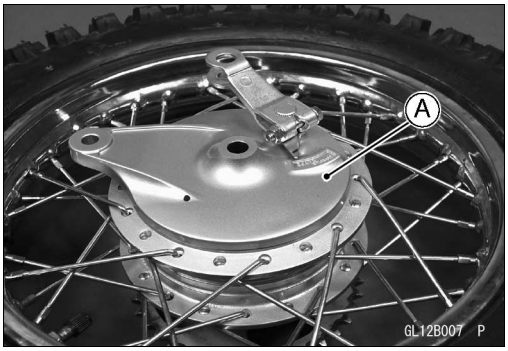
○ Refer to Brake Lining Wear Inspection in the Periodic Maintenance Chapter.

Cam Lever Angle Adjustment

○ Refer to Cam Lever Angle Adjustment in the Periodic Maintenance Chapter.

Brake Panel Removal

- Remove the front or rear wheel (see Wheels/Tires chapter).
- Separate the brake panel [A] from the wheel.



Brake Panel Installation

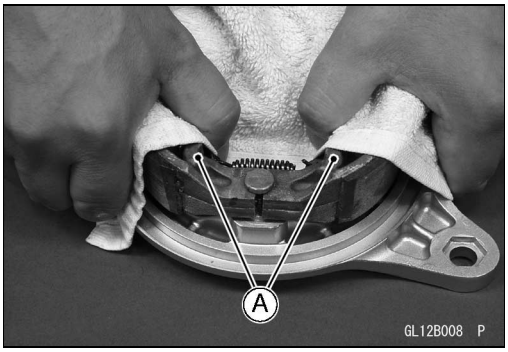
- Installation is the reverse of removal.
- Adjust the brake lever and pedal free play.

Brake Panel Disassembly

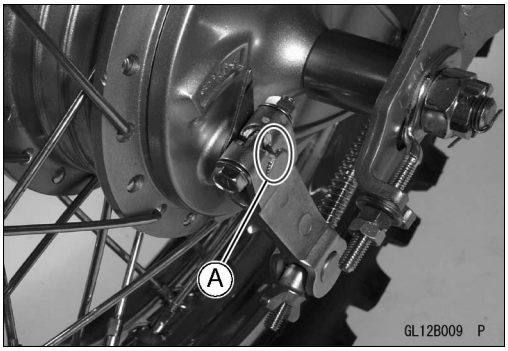
CAUTION

Do not depress the brake pedal deeply in order to separate the brake rod from the brake cam lever joint, this may extend the brake spring beyond its allowable spring extension.
Rotate the rear brake panel clockwise as far as it will go with the brake rod inserted into the brake cam lever joint, then depress the brake pedal lightly, the brake rod will be separated from the brake cam lever joint.

- Remove the wheel and separate the brake panel from the wheel.
- Using a clean cloth around the linings to prevent grease or oil from getting on them, remove and install the brake shoes [A] by pulling up on the center of the linings.



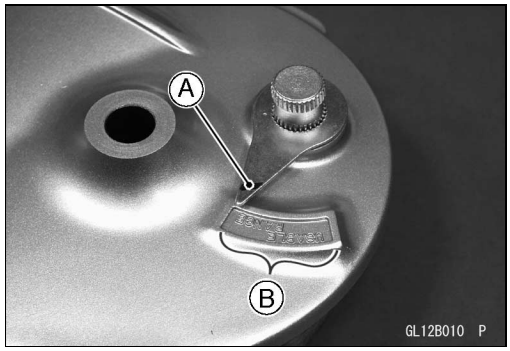
- Mark the position [A] of the cam lever before removal so that it can be installed later in the same position.
- Remove the brake cam lever.
- Pull the brake camshaft out from the brake panel inside.



Brake Panel and Drum

Brake Panel Assembly

- Lubricate the brake camshaft.
- Fit the indicator [A] on the serration so that it points to the extreme right of the USABLE RANGE [B] (Rear panel only).

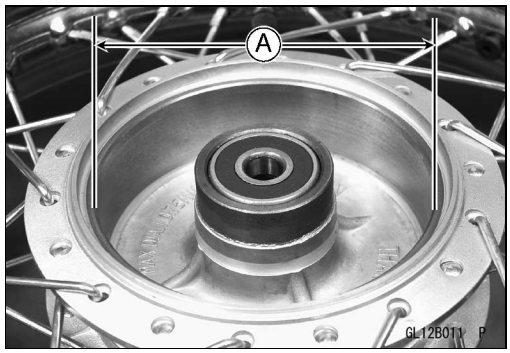


Brake Drum Wear Inspection

★ If the drum is worn unevenly or if it is scored, turn the drum down on a brake drum lathe or replace the hub with a new one. (Do not turn it down to the service limit, and do not turn it down if any diameter measurement exceeds the service limit.)

- Measure the inside diameter [A] of the brake drum. Since uneven drum wear will decrease braking effectiveness, take measurement at a minimum of two places.

★ If any diameter measurement exceeds the service limit, replace the hub with a new one.



Brake Drum Inside Diameter

Front:

Standard:	**90.000 ∼ 90.087 mm**
Service Limit:	**90.75 mm**

Rear:

Standard:	**110.000 ∼ 110.087 mm**
Service Limit:	**110.75 mm**

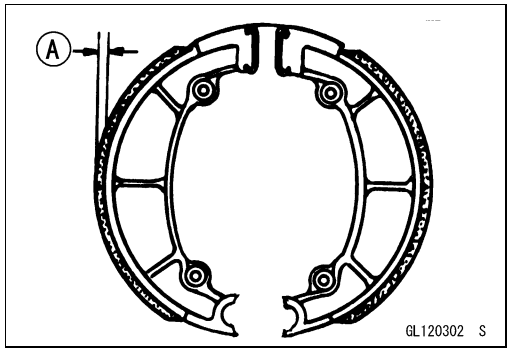
Brake Shoe Lining Wear Inspection

- Visually inspect the linings for uneven wear, and file or sand down any high spots. With a wire brush, remove any foreign particles imbedded in the lining surface. Wash off any oil or grease with a high-flash-point solvent. Do not use one which will leave an oily residue.

★ If the linings are damaged or the surface cannot be restored by sanding and cleaning, replace the shoes as a set.

- Measure the thickness of the brake linings.

★ If the thickness [A] at any point is less than the service limit, replace both shoes as a set.



Brake Shoe Lining Thickness

Front:

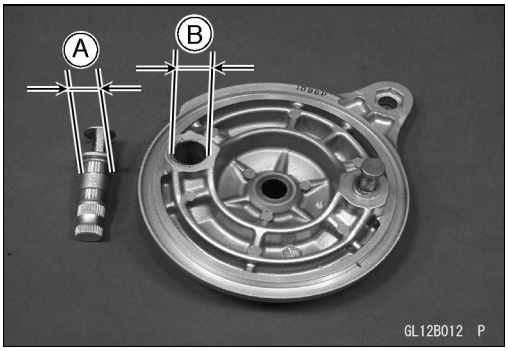
Standard:	**2.10 ∼ 3.00 mm**
Service Limit:	**1.2 mm**

Rear:

Standard:	**3.85 ∼ 4.15 mm**
Service Limit:	**2.0 mm**

Brake Panel and Drum

Camshaft Wear Inspection



● Measure the shaft diameter [A].
★If it is worn down to less than the service limit, replace the shaft.
● Measure the inside diameter [B] of the camshaft hole.
★If it is worn past the service limit, replace the brake panel.

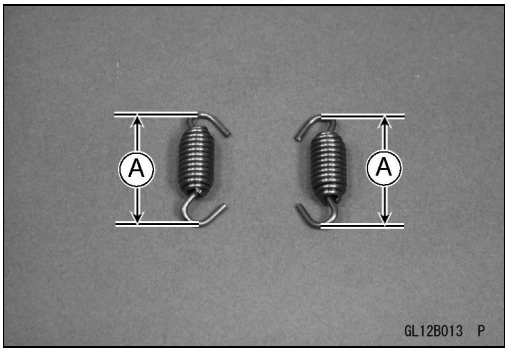
Camshaft Diameter

Front:	**Standard:**	**11.957 ∼ 11.984 mm**
	Service Limit:	**11.88 mm**
Rear:	**Standard:**	**14.957 ∼ 14.984 mm**
	Service Limit:	**14.88 mm**

Cmshaft Hole Inside Diameter

Front:	**Standard:**	**12.000 ∼ 12.027 mm**
	Service Limit:	**12.15 mm**
Rear:	**Standard:**	**15.000 ∼ 15.027 mm**
	Service Limit:	**15.15 mm**

Brake Shoe Springs Inspection



● Visually inspect the brake shoe springs for breaks or distortion.
★If the springs are damaged in any way, replace them.
● Measure [A] the free length of the brake shoe springs.
★If either is stretched beyond the service limit, replace both springs.

Brake Shoe Springs Inspection

Front:

Standard:	**30.8 ∼ 31.2 mm**
Service Limit:	**32.6mm**

Rear:

Standard:	**32.5 mm**
Service Limit:	**34.1 mm**

Brake Panel Lubrication

○ Refer to Brake Panel Lubrication in the Periodic Maintenance Chapter.

Suspension

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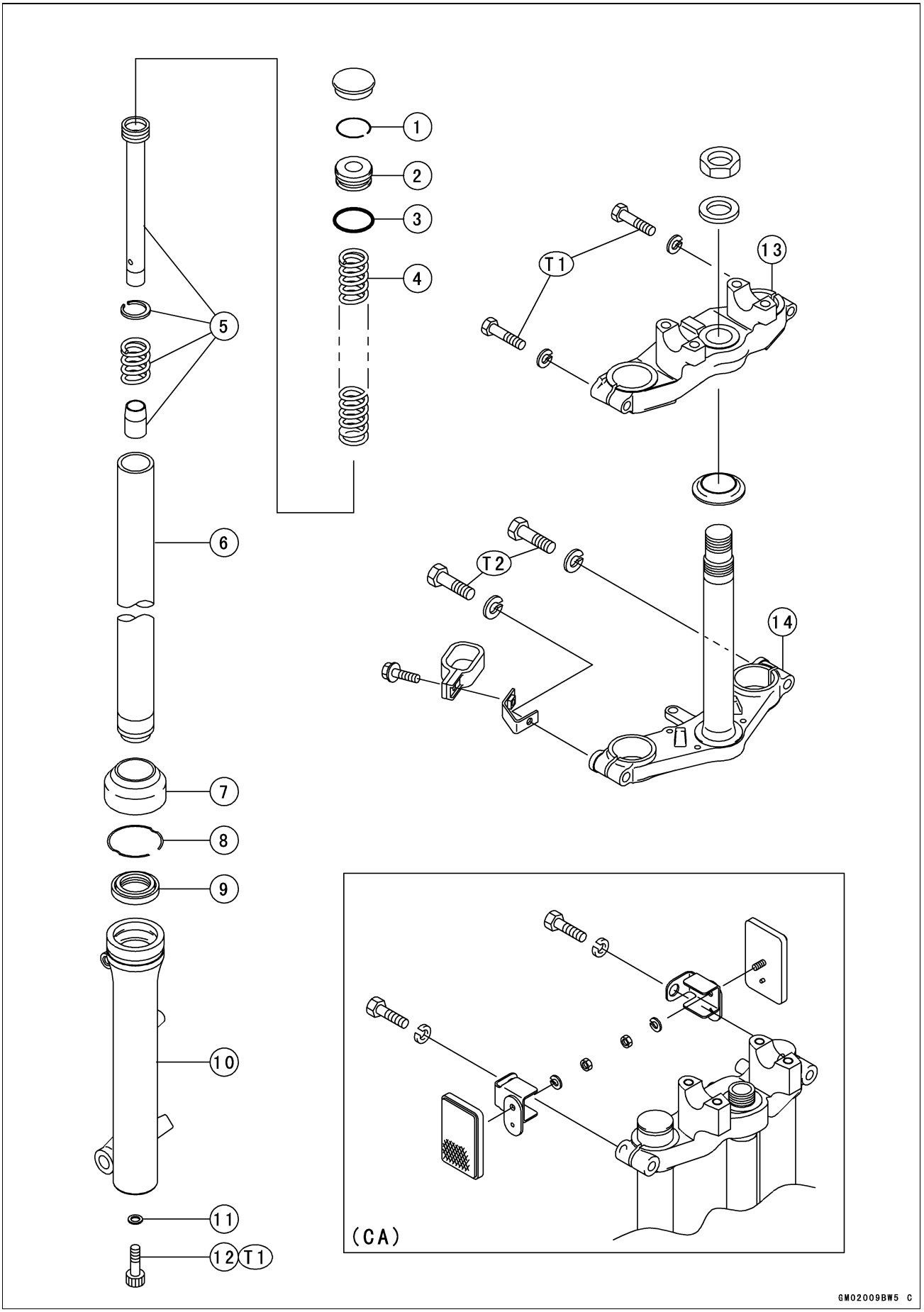
Exploded View

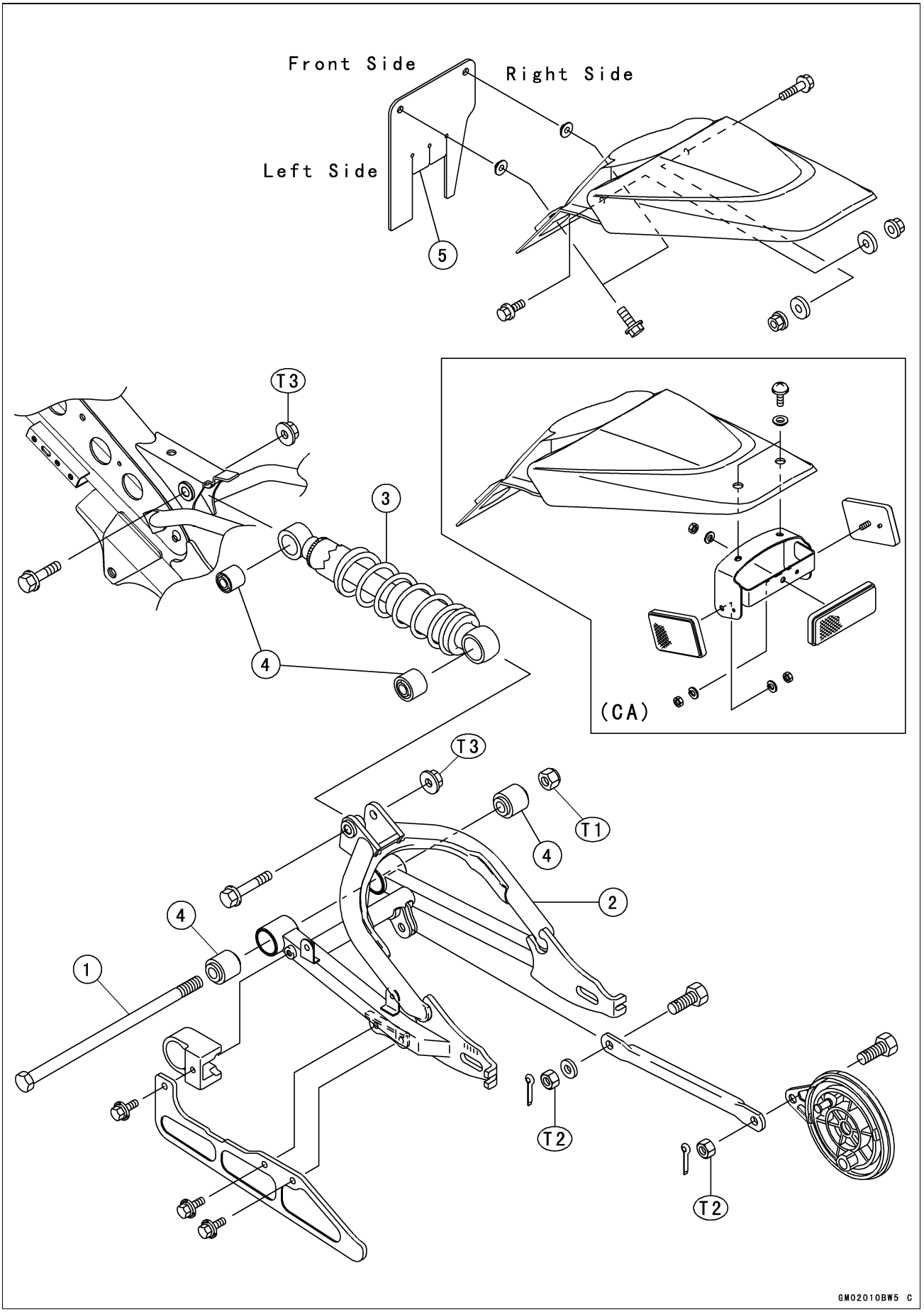


Exploded View

1. Circlip
2. Top plug
3. O-ring
4. Fork Spring
5. Cylinder Unit
6. Inner Tube
7. Dust Seal
8. Retaining Ring
9. Oil Seal
10. Outer Tube
11. Gasket
12. Allen Bolt
13. Steering Stem Head
14. Steering Stem

L: Apply a non-permanent looking agent to the threads.
T1: 20 N·m (2.0 kgf·m, 15 ft·lb)
T2: 29 N·m (3.0 kgf·m, 22 ft·lb)
CA: Canadian Model

Exploded View



Exploded View

1. Pivot Shaft
2. Swingarm
3. Rear Shock Absober
4. Rubber Bushing
5. Flap: Note the installing direction.

G: Apply grease.
T1: 78 N·m (8.0 kgf·m, 58 ft·lb)
T2: 25 N·m (2.5 kgf·m, 18 ft·lb)
T3: 39 N·m (4.0 kgf·m, 29 ft·lb)
CA: Canadian Model

Specifications

Item	Standard	Service Limit
Front Fork:		
Oil viscosity	SS-8 or SAE 10W20	– – –
Oil capacity (completely dry)	163 ± 2.5 mL	– – –
Oil level (fully compressed, spring removed)		– – –
	89 ± 2 mm (from top of inner tube)	– – –
Fork spring free length	439.7 mm	430.9 mm

Special Tools - Jack: 57001–1238
Fork Cylinder Holder Handle: 57001–183
Fork Cylinder Holder Adapter: 57001–1011
Fork Oil Seal Driver: 57001–1219
Fork Oil Level Gauge: 57001–1290
Oil Seal & Bearing Remover: 57001–1058

Front Fork

Fork Oil Level Check (Simplify)

○ Refer to Fork Oil Level Check (Simplify) in the Periodic Maintenance Chapter.

Oil Change/Oil Level Adjustment (each fork leg)

- Remove the front fork (see this chapter).
- Remove the following.
  Top Plug
  Fork Spring

⚠ WARNING

The top plugs are under extreme spring force. Use care when removing the top plugs. Wear eye and face protection.

- Hold the fork tube upside down over a clean container and pump it to drain the oil.
- Fill the front fork to the top with specified oil.

Recommended Oil

SS-8 or SAE10W20

Front Fork Oil Capacity (completely dry)

163 ± 2.5 mL

- Adjust the oil level.

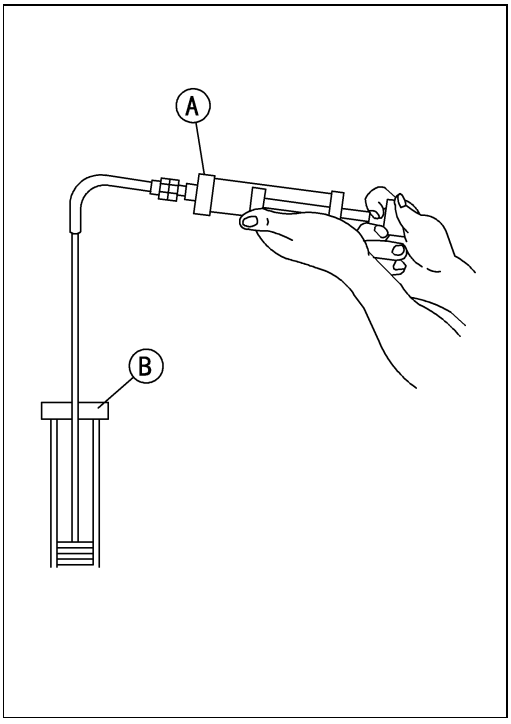
○ With the fork fully compressed, put the oil level gauge [A] and the stopper [B], and inspect the distance from the top of the inner tube to the oil.

Special Tools - Fork Oil Level Gauge: 57001–1290

Oil Level (fully compressed, without spring)
Standard: 89 ± 2 mm

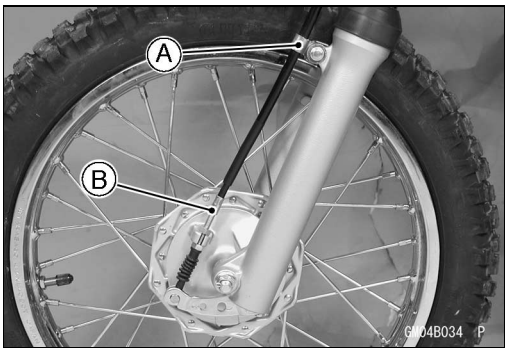
★If no oil is drawn out, there is insufficient oil in the fork tube. Pour in enough oil, then drawn out the excess oil.

- Install the parts removed (see Front Fork Assembly)



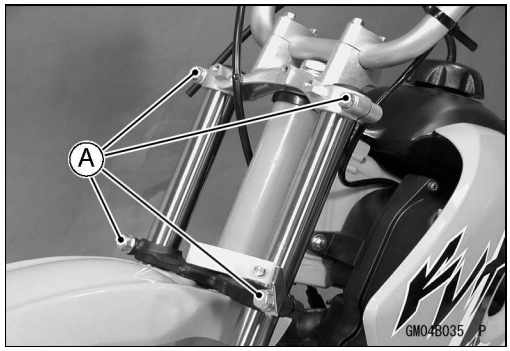
Front Fork Removal

- Remove the front brake cable clamp [A].
- Remove the front brake cable [B].
- Remove the front wheel (see Wheels/Tires chapter).



Front Fork

- Remove the number plate.
- Loosen the upper and lower fork clamp bolts [A].
- With a twisting motion, work the fork leg down and out.

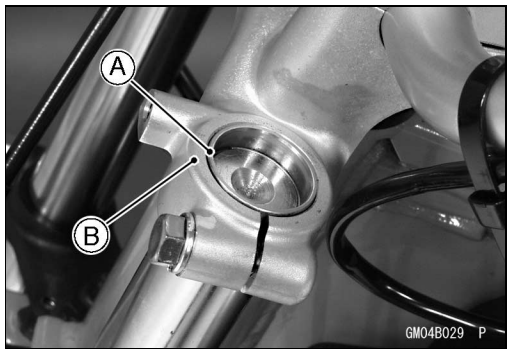


Front Fork Installation

- If the fork leg was disassembled, check the fork oil level.
- Install the fork, aligning the top end [A] of the inner tube with the upper surface [B] of the steering stem head.
- Route the cables and hose according to the Cable, Harness, Hose Routing section in the General Information chapter.
- Install the front wheel (see Wheels/Tires chapter).
- Tighten the following:

Torque - Upper Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)
Lower Fork Clamp Bolts: 29 N·m (3.0 kgf·m, 22 ft·lb)

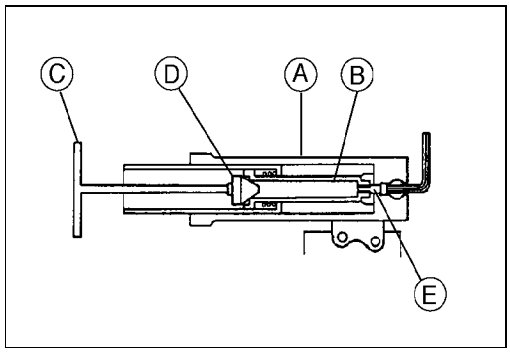
- Check the front brake operation after installation.



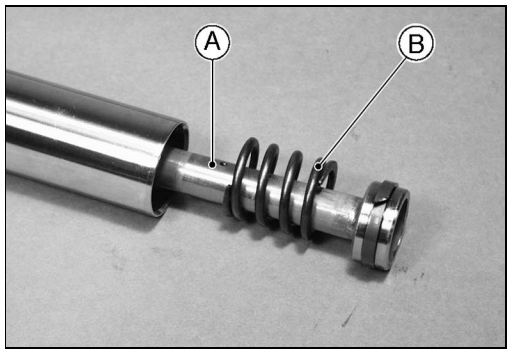
Front Fork Disassembly (each fork)

- Remove the front fork (see this chapter).
- Remove the top plug and the fork spring.
- Remove the dust seal.
- Drain the fork oil with the fork upside down (see Fork Oil Change)
- Hold the outer tube [A] in a vise.
- Stop the cylinder [B] from turning by using the front fork cylinder holder.

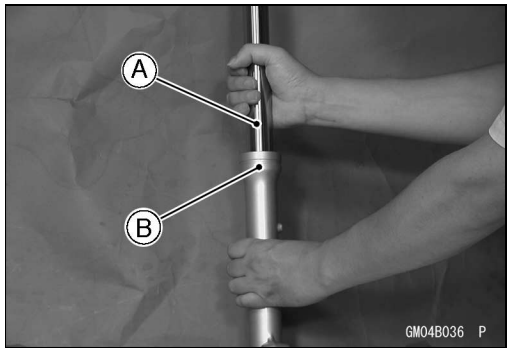
Special Tool - Fork Cylinder Holder Handle: 57001–183 [C]
Fork Cylinder Holder Adapter: 57001–1011 [D]



- Unscrew the Allen bolt [E], then take the bolt and gasket out of the bottom of the outer tube.
- Remove the cylinder unit [A] and spring [B] from the fork.

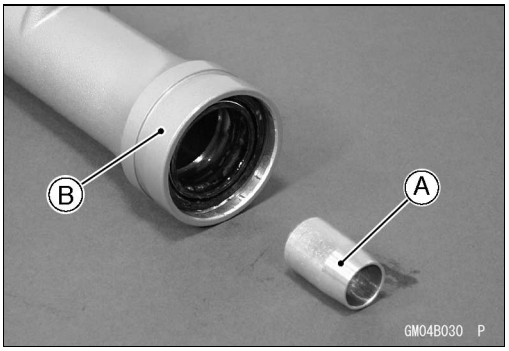


- Separate the inner tube [A] from the outer tube [B] by pulling them out.



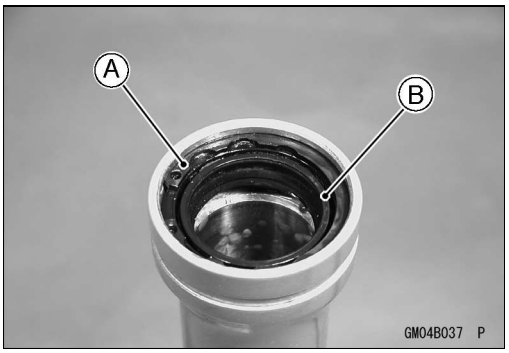
Front Fork

● Take the cylinder base [A] out of the outer tube [B].



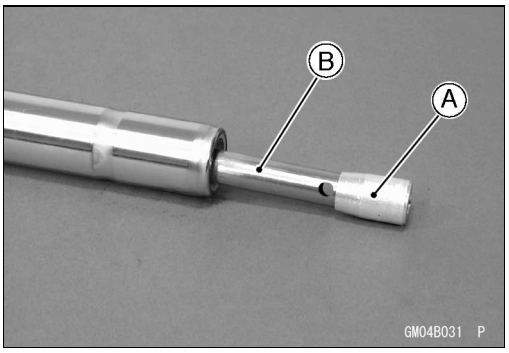
● Remove the retaining ring [A] from the outer tube.
● Remove the oil seal [B].

Special Tool - Oil Seal & Bearing Remover: 57001–1058



Front Fork Assembly (each fork)

● Assembly is the reverse of disassembly.
● Replace the following parts removed with a new one.
Retaining Ring
Oil Seal
Bottom Allen Bolt Washer
● Inspect the following and replace them with new ones if damaged.
Inner Tube (see Inner Tube Insspection)
Top Plug O-ring
● Insert the cylinder unit and spring in the inner tube.
● Insert the cylinder base [A] in the cylinder unit [B].
○ The cylinder base must be installed with the tapered side facing upward.
● Insert the inner tube and cylinder unit as a set into the outer tube.



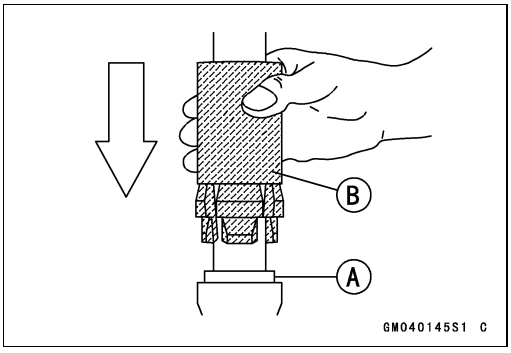
● Apply a non-permanent locking agent to the bottom Allen bolt and tighten it to the specified torque, using the front fork cylinder holder.

Torque - Bottom Allen Bolts: 20 N·m (2.0kgf·m, 15ft·lb)

Special Tool - Fork Cylinder Holder Handle: 57001–183
Fork Cylinder Holder Adapter: 57001–1011

● Install the oil seal [A] by tapping with the fork oil seal driver [B] until it stops.

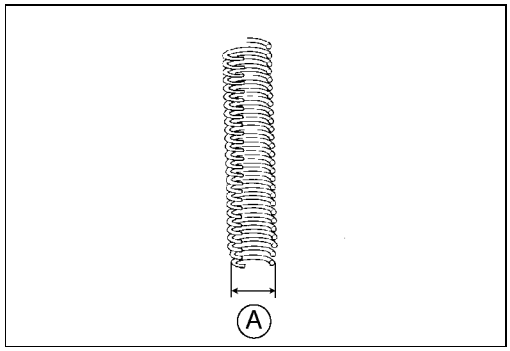
Special Tool - Fork Oil Seal Driver: 57001–1219



● Install the following.
Retainer
Dust Seal

Front Fork

- Mesure the both diameters of the fork spring ends and insert the fork spring with the small diameter and [A] facing down.
- Pour the fork oil (see Fork Oil change).
- Install the front fork (see this chapter).



Front Fork Inner Tube Inspection

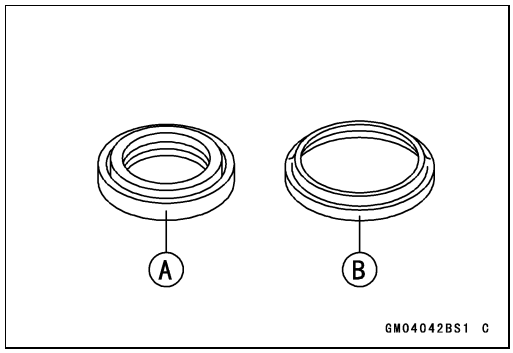
○ Refer to Inner Tube Inspection in the Periodic Maintenance Chapter.

Dust Seal/Oil Seal Inspection

- Inspect the dust seal [B] for any signs of deterioration or damage.

★Replace it if necessary.

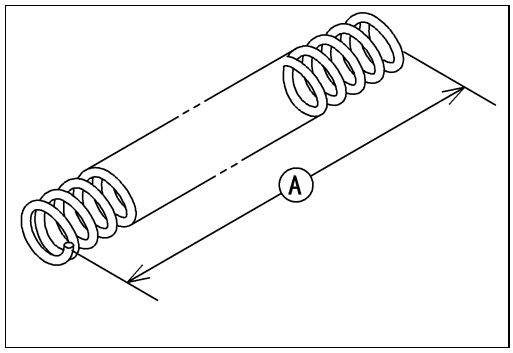
- Replace the oil seal [A] with a new one whenever it has been removed.



Spring Tension

- Since a spring becomes shorter as it weakens, check its free length [A] to determine it condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced fro motorcycle stability.



Fork Spring Free Length

Standard:	**439.7 mm**
Service Limit:	**430.9 mm**

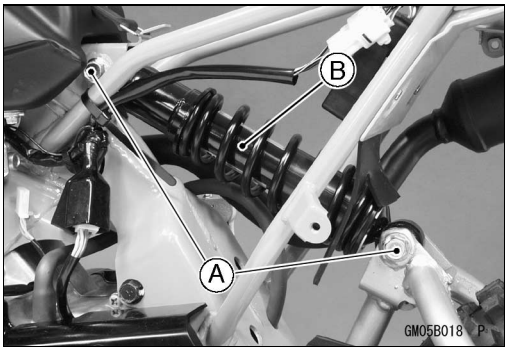
Rear Shock Absorber

Removal

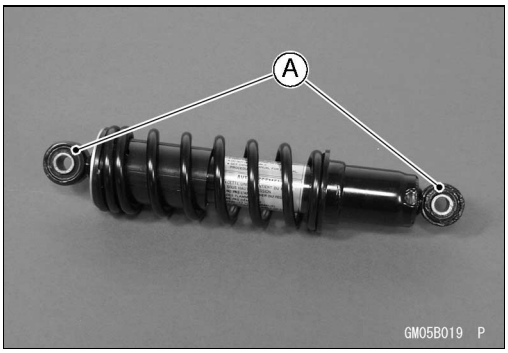
- Using the jack under the frame, raise the rear wheel off the ground.

  Special Tool - Jack: 57001–1238

- Remove the shock absorber mounting bolt [A], nut and pull off the shock absorber [B].



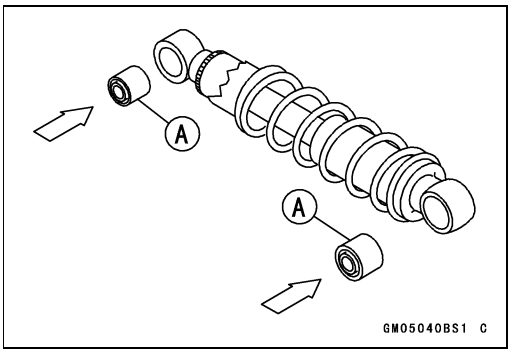
- To remove the rubber bushings [A], tap out the bushing with a suitable tool.



Installation

- Press in the rubber bushings [A] as shown.
- Install the shock absorber.
- Tighten the shock absorber mounting bolt and nut.

  Torque - Upper Mounting Bolt: 39 N·m (4.0 kgf·m, 29 ft·lb)
  Lower Mounting Bolt: 39 N·m (4.0 kgf·m, 29 ft·lb)



Rear Shock Absorber Inspection

○ Refer to Rear Shock Absorber Inspection in the Periodic Maintenance Chapter.

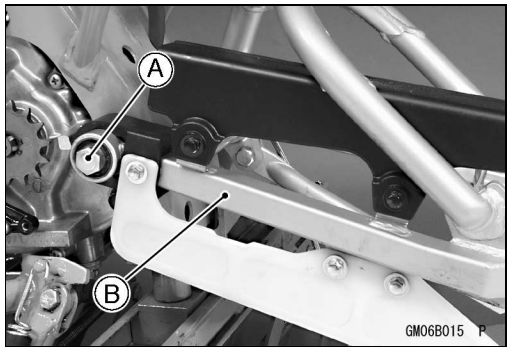
Swingarm

Swingarm Removal

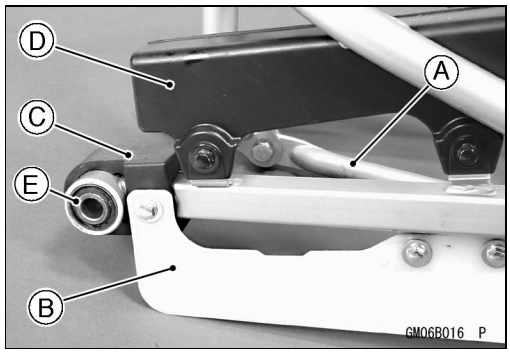
- Using the jack under the frame, raise the rear wheel off the ground.

  Special Tool - Jack: 57001–1238

- Remove:
  Rear Wheel (see Wheels/Tires chapter)
  Left Side Cover (see Frame chapter)
  Drive Chain
  Rear Shock Absorber Lower End
- Remove the pivot shaft nut and pull out the pivot shaft [A].
- Pull back the swingarm [B] and take off the swingarm.



- Remove:
  Torque Link [A]
  Chain Guide[B]
  Chain Slipper [C]
  Chain Cover [D]
- To remove the rubber bushing [E] at the pivot, tap out the bushing with a suitable tool.



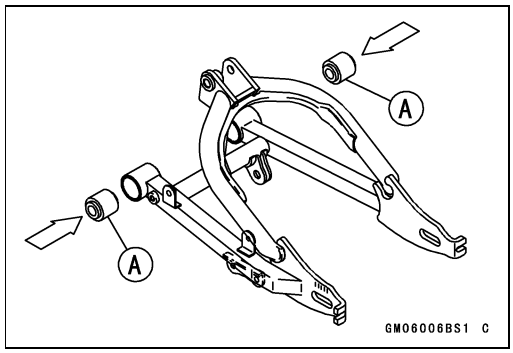
Swingarm Installation

- Installation is the reverse of removal.
- Press in the rubber bushings [A] as shown.
- Tighten the pivot shaft nut after installed the rear shock absorber.

  Torque - Swingarm Pivot Shaft Nut: 78 N·m (8.0 kgf·m, 58 ft·lb)

- Tighten the torque link nut.

  Torque - Torque Link Nut: 25 N·m (2.5 kgf·m, 18 ft·lb)



Swingarm Rubber Bushing Inspection

○ Refer to Swingarm Rubber Bushing Inspection in the Periodic Maintenance Chapter.

Steering

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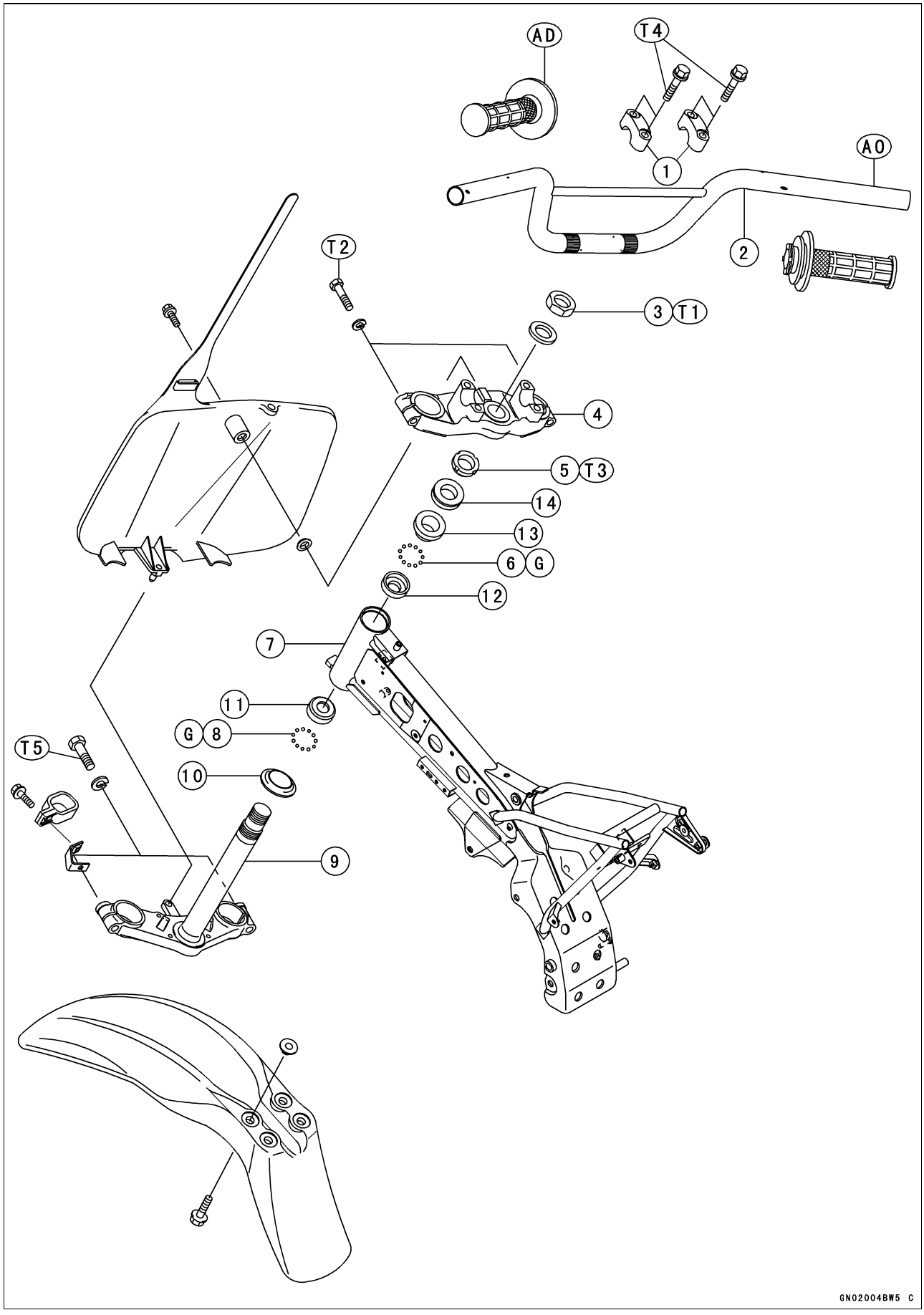
Exploded View



Exploded View

1. Handlebar Clamp
2. Handlebar
3. Steering Stem Head Nut
4. Steering Stem Head
5. Stem Locknut
6. Upper Steel Balls
7. Head Pipe
8. Lower Steel Balls
9. Steering Stem
10. Lower Inner Race
11. Lower Outer Race
12. Upper Outer Race
13. Upper Inner Race
14. Stem Cap

AO: Apply 2–stroke oil.
AD: Apply adhesive cement.
G: Apply grease.
T1: 44 N·m (4.5 kgf·m, 32 ft·lb)
T2: 20 N·m (2.0 kgf·m, 15 ft·lb)
T3: 4.9 N·m (0.5 kgf·m, 43 in·lb)
T4: 25 N·m (2.5 kgf·m, 18 ft·lb)
T5: 30 N·m (3.0 kgf·m, 22 ft·lb)

Specifications

Special Tools - Steering Stem Bearing Driver: 57001–137
Steering Stem Nut Wrench: 57001–1100
Jack: 57001–1238
Bearing Driver Set: 57001–1129
Bearing Puller: 57001–158
Bearing Puller Stud: 57001–1190
Bearing Puller Adapter: 57001–317

Steering

Steering Inspection

○ Refer to Steering Inspection in the Periodic Maintenance Chapter.

Steering Adjustment

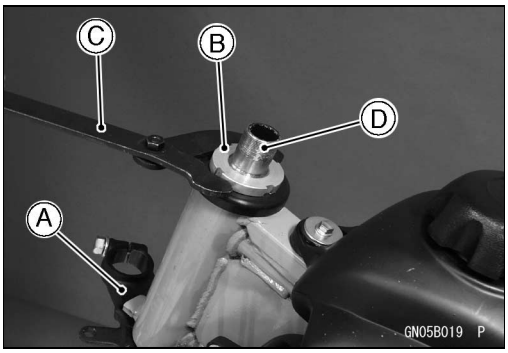
○ Refer to Steering Adjustment in the Periodic Maintenance Chapter.

Steering Stem Removal

● Remove:
Front Wheel (see Wheels/Tires chapter)
Front Brake Cable Clamp
Front Fender
Handlebar (see Handlebar Removal)
Front Fork (see Suspension chapter)

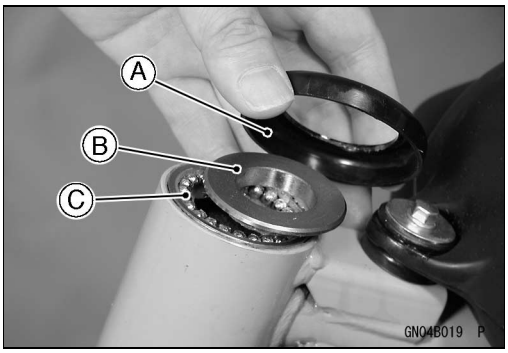
● Remove the steering stem head nut and washer.
● Remove the steering stem head.
● Pushing up on the stem base [A], and remove the steering stem locknut [B], with the steering stem nut wrench [C], then remove the steering stem [D] and stem base.

Special Tool - Steering Stem Nut Wrench: 57001–1100



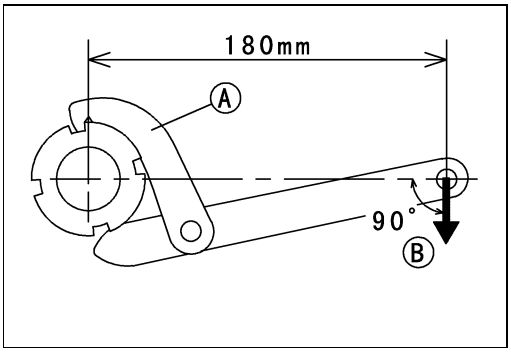
● As the stem is removed, some of the steel balls will drop out of the lower outer race.
● Remove the remaining ball bearings from the lower bearing outer race. There are 23 steel balls installed in the lower outer race.

● Remove:
Steering Stem Cap [A]
Upper Inner Race [B]
Upper Steel Balls [C]
○ There are 23 steel balls installed in the upper outer race.



Steering Stem Installation

● Apply grease liberally to the upper and lower outer races in the head pipe so that the steel balls will stick in place during stem insertion, and install upper and lower steel balls.
● Using the stem nut wrench, temporarilly tighten (hand tighten) the stem locknut to press the steel balls against the outer race.



- Install the stem head and washer, and tighten the stem head nut lightly.
- Settle the bearing in place as follows;
  - Tighten the stem locknut to 39 N·m (4.0 kgf·m, 29 ft·lb) of torque. (To tighten the steering stem locknut to the specified torque, hook the wrench [A] on the stem locknut, and pull the wrench at the hole by 22.2 kg force [B] in the direction shown).

Special Tool - Steering Stem Nut Wrench: 57001–1100

  - Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.
  - Again back out the stem locknut a fraction of a turn until it turns lightly.
  - Turn the stem locknut lightly clockwise until it just becomes hard to turn. Do not overtighten, or the steering will be too tight.

Torque - Steering Stem Locknut: 4.9 N·m (0.5 kgf·m, 43 in·lb)

- Install the front fork (see the Suspension chapter).

NOTE

  - *Tighten the fork upper clamp bolts first, next the stem head nut, last the fork lower clamp bolt.*

Torque - Steering Stem Head Nut: 44 N·m (4.5 kgf·m, 32 ft·lb)
Front Fork Clamp Bolt:
Upper: 20 N·m (2.0 kgf·m, 15 ft·lb)
Lower: 29 N·m (3.0 kgf·m, 22 ft·lb)

- Install the parts removed (see the appropriate chapter).

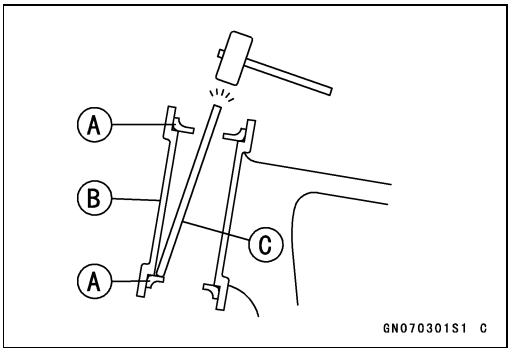
⚠ WARNING

Do not impede the handlebar turning by routing the cables, wires and hoses improperly (see the General Information chapter).

- Check and Adjust:
  Steering
  Front Brake
  Throttle Cable

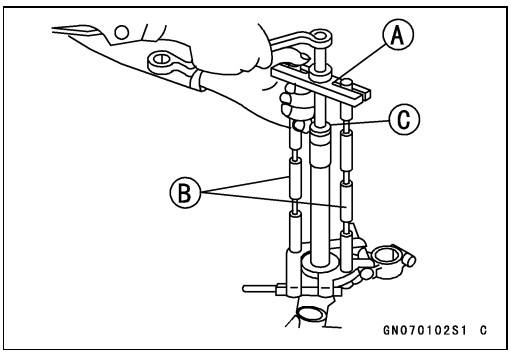
Steering Stem Race Removal

- To remove the outer races [A] pressed into the head pipe, insert a bar [C] into the head pipe [B], and hammer evenly around the circumference of the opposite race to drive it out.



- Remove the lower inner race on the steering stem with a bearing puller [A].

Special Tool - Bearing Puller: 57001–158
Bearing Puller Stud: 57001–1190 [B]
Bearing Puller Adapter: 57001–317 [C]

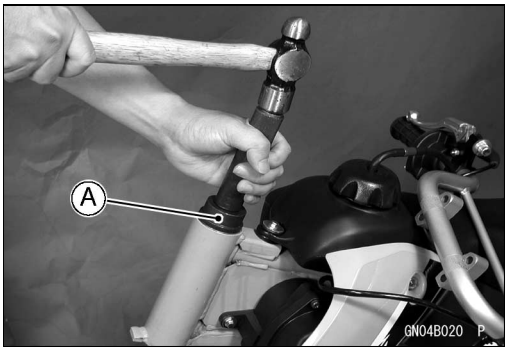


Steering

Steering Stem Race Installation Notes

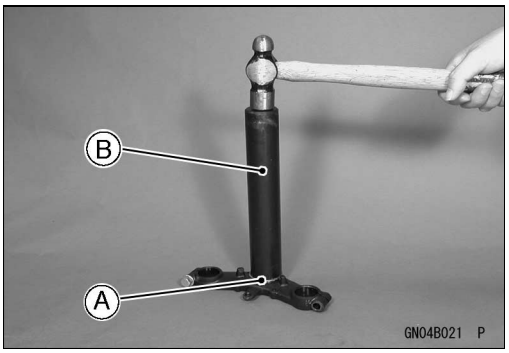
- Apply engine oil to the outer races, and then drive them into the head pipe using the bearing driver set [A].

Special Tool - Bearing Driver Set: 57001–1129



- Drive the lower inner race [A] onto the steering stem using the stem bearing driver [B].

Special Tool - Steering Stem Bearing Driver: 57001–137



Steering Stem Bearing Lubrication

○ Refer to Steering Stem Bearing Lubrication in the Periodic Maintenance Chapter.

Steering Stem Bearing Inspection

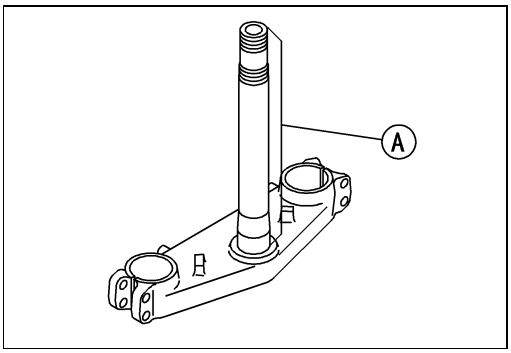
- Using a high-flash-point solvent, wipe the bearings clean of grease and dirt.
- Check the races and balls.

★If the balls or races are worn, or if either race is dented, replace both races and all the balls for that bearing as a set.

Steering Stem Warp

- Whenever the steering stem is removed, or if the steering cannot be adjusted for smooth action, check the steering stem for straightness.

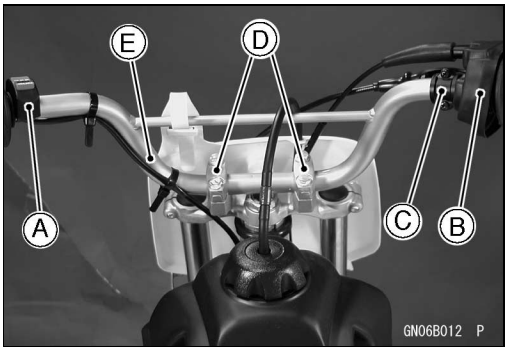
★If the steering stem shaft [A] is bent, replace the steering stem.



Handlebar

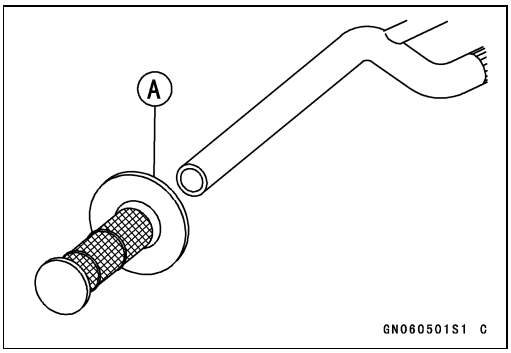
Handlebar Removal

● Remove:
Engine Stop Switch [A]
Throttle Grip Assembly [B]
Brake Lever Holder [C]
Handlebar Holders [D]
Handlebar [E]

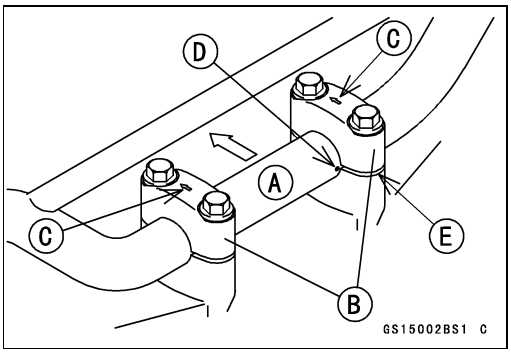


Handlebar Installation

● Apply adhesive cement to the inside of the left handlebar grip [A].



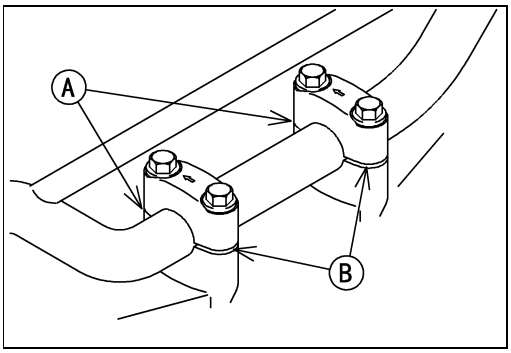
● Mount the handlebar clamps [B] so that the arrows [C] on the clamp point at the front [A].
○ Align a gap [E] at the rear with the punch mark [D] on the handlebar.



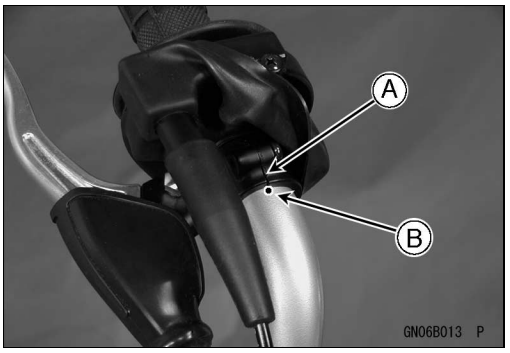
● Torque the handlebar clamp bolts.

Torque - Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

○ Tighten the clamp bolts, front first and then the rear. If the handlebar clamp is correctly installed, there will be no gap [A] at the front and a gap [B] at the rear after tightening.

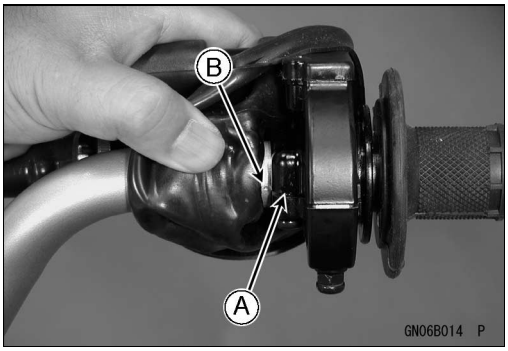


● Apply grease to the throttle cable upper end.
● Install the brake lever holder as shown.
○ Position the brake lever holder so that its vertical parting line [A] is aligned with punch mark [B] on the handlebar.



Handlebar

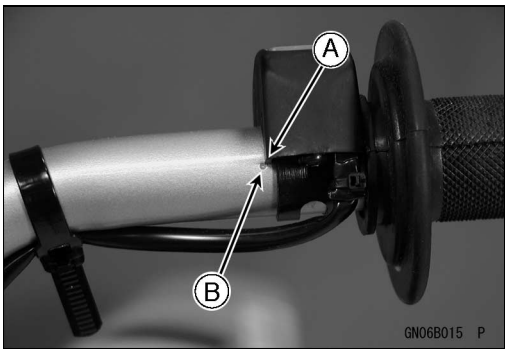
○ Position the throttle housing so that its vertical parting line [A] is aligned with punch mark [B] on the handlebar.



○ Position the engine stop switch so that its edge [A] is aligned with the punch mark [B] on the handlebar.

● Install the handlebar holder (see Steering Stem Bearing Installation).

Torque - Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



Electrical System

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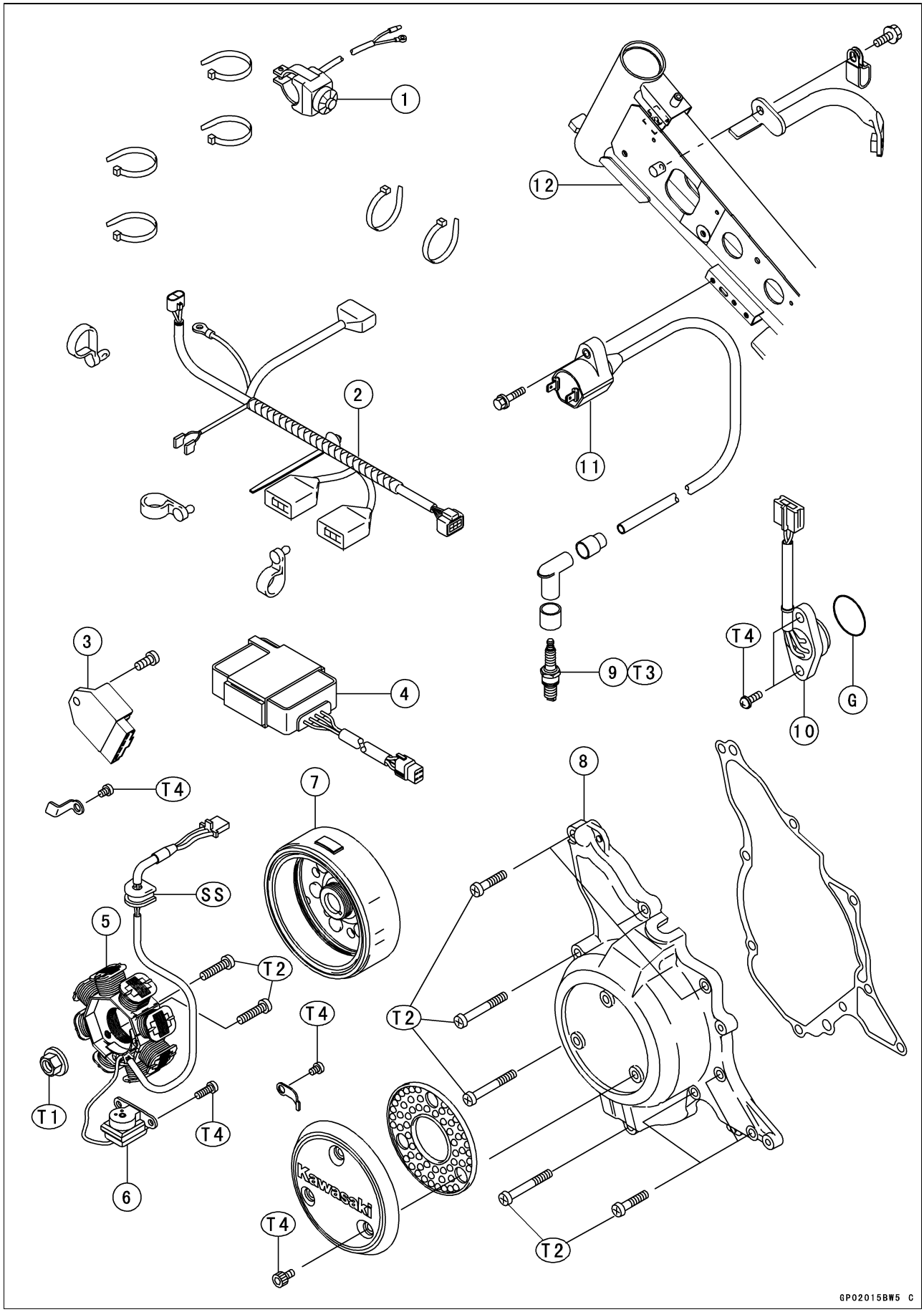
Exploded View



Exploded View

G: Apply grease.
SS: Apply silicone sealant.
1. Engine Stop Switch
2. Main Harness
3. Regulator/Rectifier
4. Igniter
5. Exciter Coil
6. Pickup Coil
7. Flywheel
8. Magneto Cover
9. Spark Plug
10. Gear Position Switch
11. Ignition Coil
12. Frame

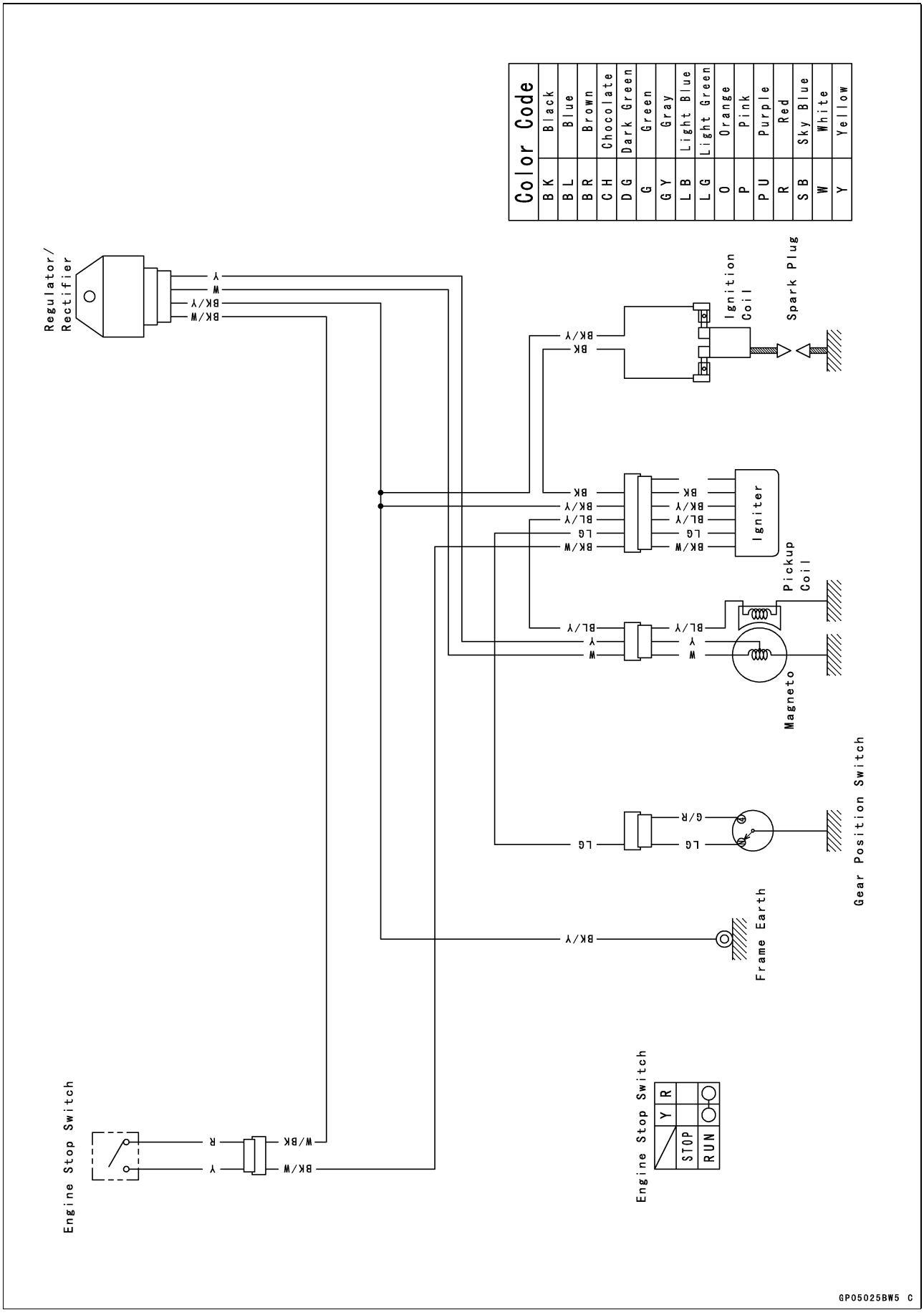
T1: 41.5 N·m (4.25 kgf·m, 30.6 ft·lb)
T2: 5.2 N·m (0.53 kgf·m, 46 in·lb)
T3: 13 N·m (1.3 kgf·m, 9.6 ft·lb)
T4: 2.9 N·m (0.3 kgf·m, 26 in·lb)

Specifications

Item	Standard	Service Limit
Magneto:		
Regulator/rectifier resistance	in the text	- - -
Ignition System:		- - -
Pickup coil resistance	50 ∼ 200 Ω (Blue/Yellow← →Ground)	- - -
Air gap	0.7 mm	
Ignition coil:		
Primary winding resistance	0.19 ∼ 0.23 Ω	- - -
Secondary winding resistance primary	2.5 ∼ 3.7 kΩ	- - -
Exciter coil resistance	0.2 ∼ 1.0 Ω (White ← →Ground)	- - -
	0.1 ∼ 0.8 Ω (Yellow ← →Ground)	- - -
Spark plug:		
Standard plug	NGK CR6HSA	- - -
Gap	0.6 ∼ 0.7 mm	- - -
Peak voltage:		
Ignition coil (primary)	100 V or above	- - -
Pickup coil	4.6 V or above	- - -
Exciter coil	15 V or above	- - -

Special Tool - Spark Plug Wrench, Hex 16: 57001–1262
Hand Tester: 57001–1394
Flywheel Puller, M28 × 1.0: 57001–1471
Rotor Puller, M16/M18/M20/M22 x 1.5: 57001–1216
Flywheel Holder: 57001–1313

Wiring Diagram



Precautions

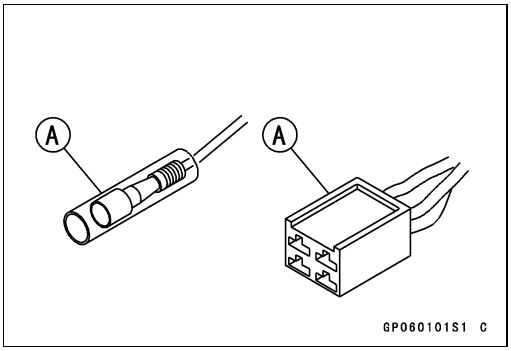
There are a number of important precautions that need to follow during servicing electrical systems. Learn and observe all the rules below.

- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).
- Color Codes:

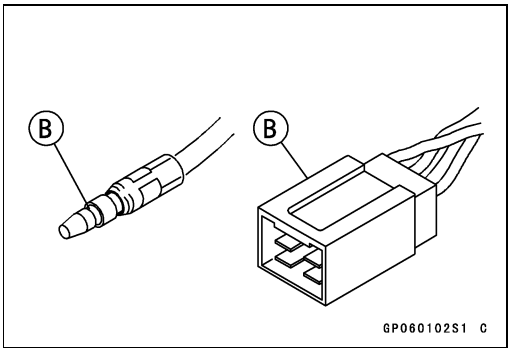
BK: Black	GY: Gray	R: Red
BL: Blue	LB: Light blue	SB: Sky Blue
BR: Brown	LG: Light green	W: White
CH: Chocolate	O: Orange	Y: Yellow
DG: Dark green	P: Pink	
G: Green	PU: Purple	

- Electrical Connectors

Female Connectors [A]



Male Connectors [B]



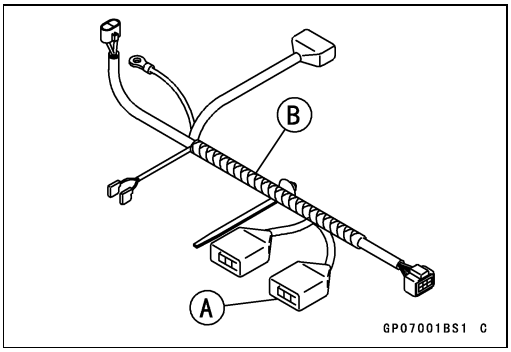
Electrical Wiring

Wiring Inspection

● Visually inspect the wiring for signs of burning, fraying, etc.
★ If any wiring is poor, replace the damaged wiring.
● Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
● Check the wiring for continuity.
○ Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
○ Connect the hand tester between the ends of the leads.

Special Tool - Hand Tester: 57001–1394

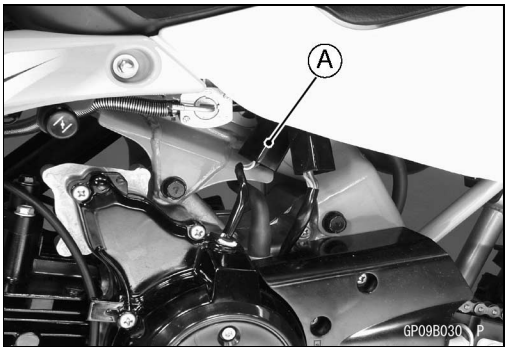
○ Set the tester to the x 1 Ω range, and read the tester.
★ If the tester does not read 0 Ω, the lead is defective. Replace the lead or the wiring harness [B] if necessary.



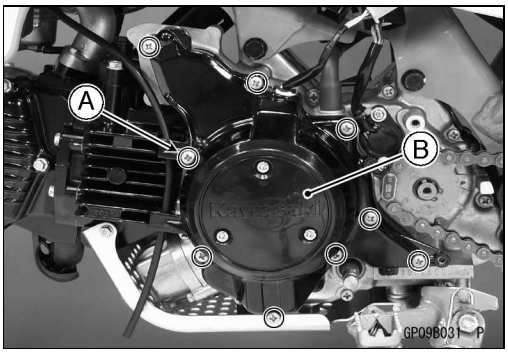
Flywheel Magneto

Magneto Cover Removal

- Drain the engine oil.
- Remove:
  Shift Pedal
  Engine Sprocket Cover (see Final Drive chapter)
- Pull off the magneto connector [A].

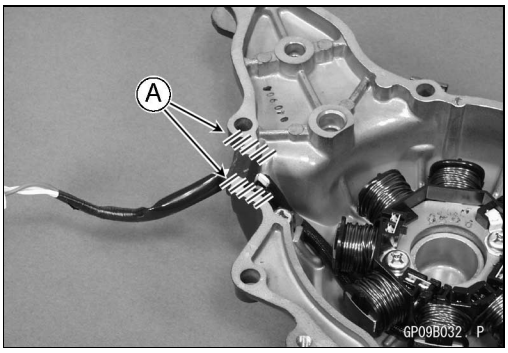


- Unscrew the magneto cover screws [A] and remove the magneto cover [B].



Magneto Cover Installation

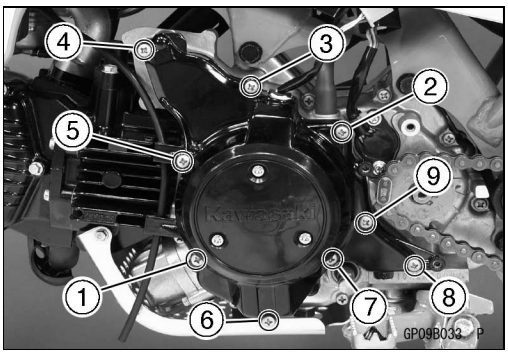
- Check that two dowel pins are in place in the left crankcase half.
- Replace the gasket.
- Apply silicone sealant [A] around the circumference of the wiring grommet.
- Install the magneto cover.



- Tighten the magneto cover screws following the tightening sequence as shown.

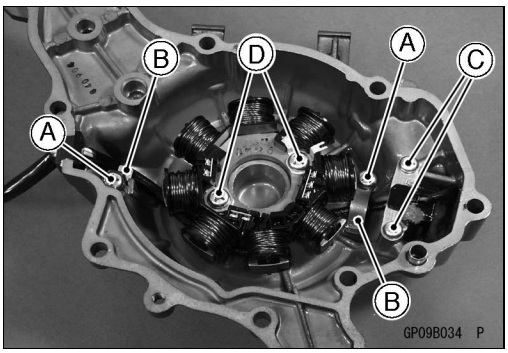
  Torque - Magneto Cover Screws: 5.2 N·m (0.53 kgf·m, 46 in·lb)

- Fill the engine with engine oil (see Engine Lubrication System chapter).



Magneto Cover Disassembly

- Remove the magneto cover.
- Remove:
  Screws [A]
  Clamps [B]
  Pickup Coil Screws [C]
  Exciter Coil Screws [D]
- Pull the wiring grommet.
- Remove the pickup coil and stator as a set.



Flywheel Magneto

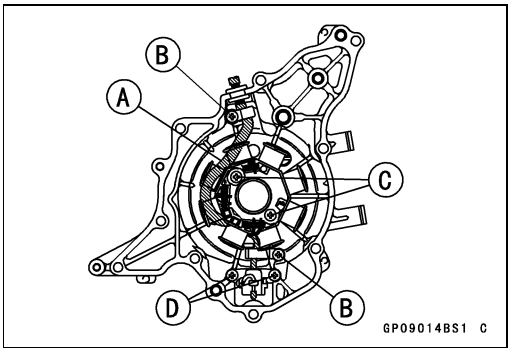
Magneto Cover Assembly

- Run the magneto lead [A] as shown.
- Torque:

Plate Screws [B]: 2.9 N·m (0.3 kgf·m, 26 in·lb)

Exciter Coil Mounting Screws [C]: 5.2 N·m (0.53 kgf·m, 46 in·lb)

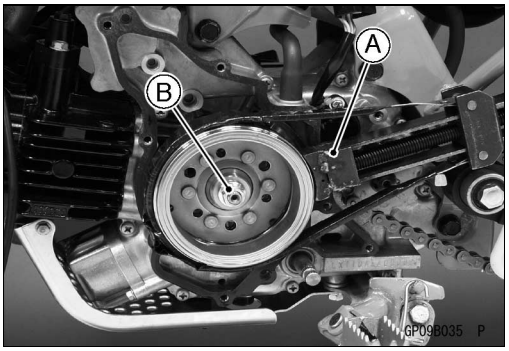
Pickup Coil Mounting Screws [D]: 2.9 N·m (0.3 kgf·m, 26 in·lb)



Magneto Flywheel Removal

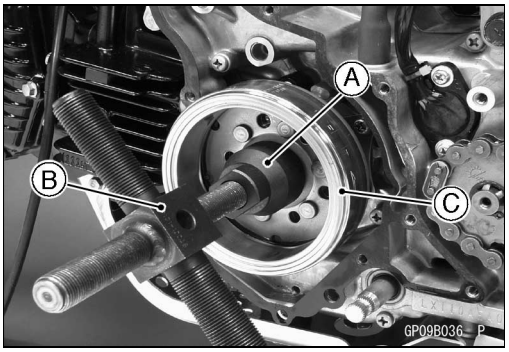
- Remove the magneto cover (see this chapter).
- Loosen the front footpeg assembly.
- Hold the flywheel steady with the flywheel holder [A] and remove the flywheel nut [B].

Special Tool - Flywheel Holder: 57001–1313



- Thread the flywheel puller [A] and rotor puller [B] onto the flywheel [C].
- Holding the flywheel puller, turn the rotor puller until the flywheel is forced off the end of the crankshaft.
- Using the flywheel and rotor pullers, remove the magneto flywheel.

Special Tools - Rotor Puller, M16/M18/M20/M22 x 1.5: 57001–1216
Flywheel Puller, M28 × 1.0: 57001–1471



CAUTION

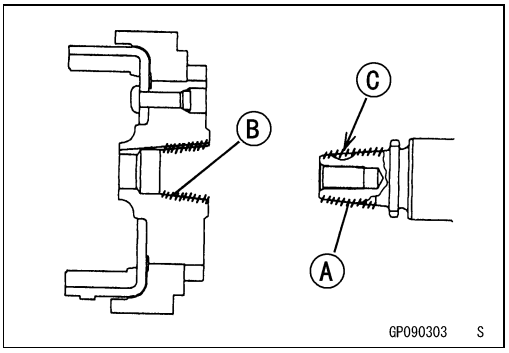
If the rotor is difficult to remove, turn the puller shaft using a wrench while tapping the head of the puller shaft with a hammer. Do not attempt to strike the grab bar or the alternator rotor itself. Striking the bar or the rotor can cause the bar to bend or the magnets to lose their magnetism.

Magneto Flywheel Installation

- Using a high-flash-point solvent, clean off the any oil or dirt that may be on the crankshaft tapered portion [A] and flywheel tapered portion [B].
- Fit the woodruff key [C] securely in the slot of the crankshaft before installing the flywheel on the crankshaft.
- Tighten the flywheel nut while holding the flywheel steadily with the flywheel holder.

Torque - Magneto Flywheel Nut: 41.5 N·m (4.25 kgf·m, 30.6 ft·lb)

Special Tools - Flywheel Holder: 57001–1313



Flywheel Magneto

Flywheels Magneto Inspection

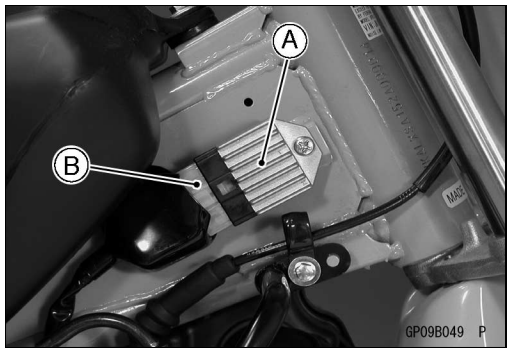
- There are three types of magneto problems: short, open (wire burned out), or loss in flywheel magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in flywheel magnetism, which may be caused by dropping or hitting the flywheel by leaving it near an electromagnetic field, or just by aging, will result in low output. Inspect the coils and flywheel (see Ignition System).

Regulator/Rectifier Inspection

- Remove:
  Right Shroud
  Regulator/Rectifier [A]
- Disconnect the connector [B] from the regulator/rectifier.
- Set the hand tester (special tool) to the × 1 kΩ range and make the measurements shown in the table.

Special Tool - Hand Tester: 57001–1394

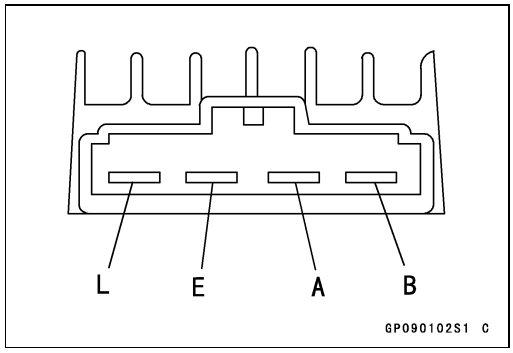
★If the reading is not the specified value, replace the regulator/rectifier.



Regulator/Rectifier Internal Resistance **Unit: kΩ**

		Tester (+) Lead Connection			
	Terminal	L	E	A	B
(-)*	L	–	10∼100	∞	∞
	E	10∼100	–	∞	∞
	A	∞	∞	–	5∼30
	B	∞	∞	∞	–

(-)*: Tester (–) Lead Connection



CAUTION

Use only Hand Tester 57001-1394 for this test. An ohmmeter other than the Hand Tester may show different readings. If a megger or a meter with a large-capacity battery is used, the regulator will be damaged.

Ignition System

⚠ WARNING

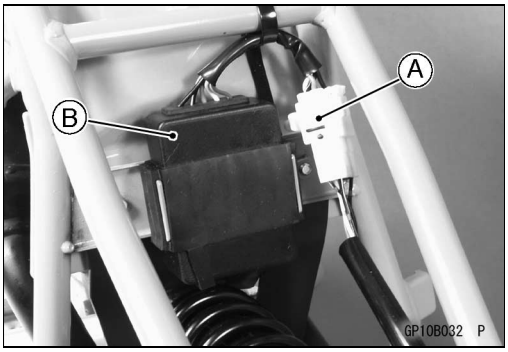
The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil, or spark plug lead while the engine is running, or you could receive a severe electrical shock.

CAUTION

Do not disconnect the electrical connections while the engine is running. This is to prevent igniter damage.
The negative side is grounded. This is to prevent damage to the diodes and Igniter.

Igniter Removal

- Remove:
  Seat
  Connector [A]
  Igniter [B]

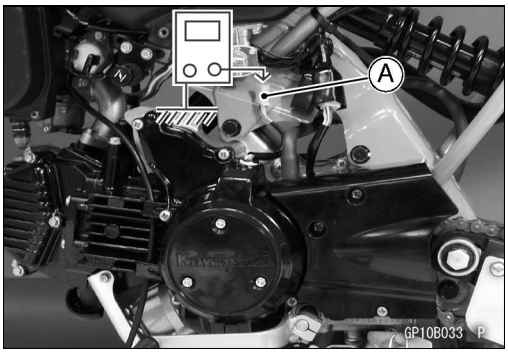


Exciter Coil Resistance Measurement

- Remove the left side cover.
- Disconnect the magneto lead connector [A].
- Set the hand tester to the x 10 Ω range, and connect it to the leads from the exciter coil to check the resistance.

Special Tool - Hand Tester: 57001–1394

★If the reading is not the specified value, replace the stator.



Exciter Coil Resistance **Unit: Ω**

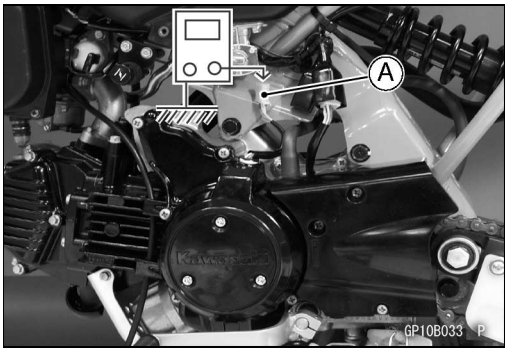
Tester Range	Connections		Reading
	Tester Lead	Another Lead	
x 10 Ω	Ground	White Lead	0.2 ∼ 1.0
	Ground	Yellow Lead	0.1 ∼ 0.8

Pickup Coil Resistance Measurement

- Remove the left side cover.
- Disconnect the magneto lead connector [A].
- Set the hand tester to the x 100 Ω range, and connect it to the lead from the pickup coil to check the resistance.

Special Tool - Hand Tester: 57001–1394

★If the reading is not the specified value, replace the stator.



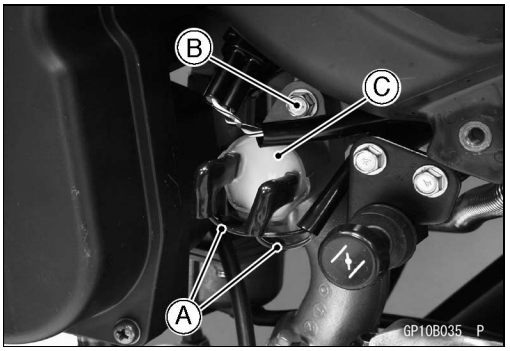
Pickup Coil Resistance **Unit: Ω**

Tester Range	Connections		Reading
	Tester Lead	Another Lead	
x 100 Ω	Ground	Blue/Yelow Lead	50 ∼ 200

Ignition System

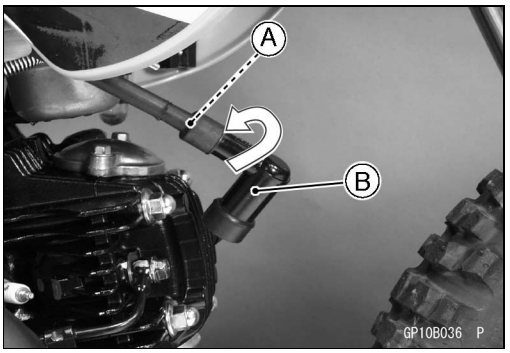
Ignition Coil Removal

- Remove:
  Left Side Cover
  Spark Plug Cap
- Disconnect the ignition coil leads [A].
- Unscrew the bolt [B] and remove the ignition coil [C].

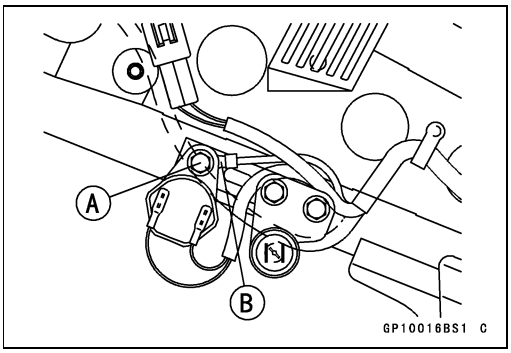


Ignition Coil Installation

- Installation is the reverse of removal.
- Apply silicone grease to the spark plug lead end [A].
- Turn in the spark plug cap [B] securely.



- Install the ignition coil mounting bolt [A] with the ground terminal [B] as shown (see Cable, Wire and Hose Routing section in the General Information chapter).

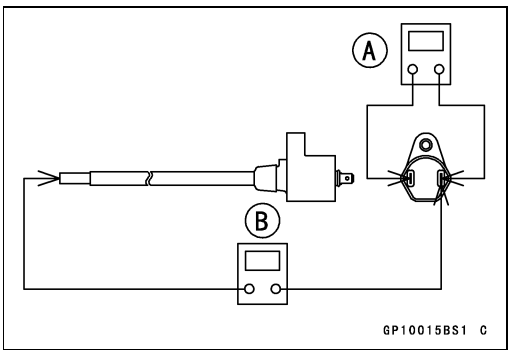


Ignition Coil Inspection

- Remove the ignition coil.
- Measure the primary winding resistance.
- ○ Connect the hand tester between the coil terminals.

Special Tool - Hand Tester: 57001–1394

- ○ Set the tester to the x 1 Ω range, and read the meter.
- Measure the secondary winding resistance.
- ○ Pull the spark plug cap off the lead.
- ○ Connect the hand tester between the spark plug lead and the green terminal (earth).
- ○ Set the tester to the x 1 kΩ range, and read the meter.
- ★ If the meter does not read as specified, replace the coil.
  Measure primary winding resistance [A]
  Measure secondary winding resistance [B]



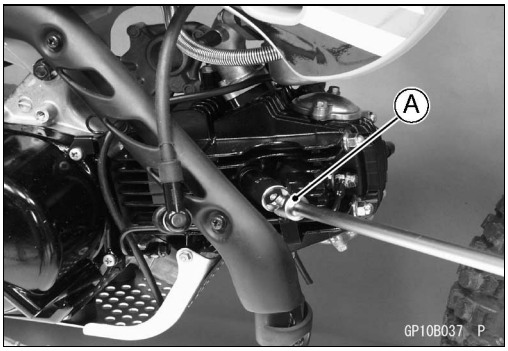
Ignition Coil Winding Resistance

Primary Windings:	**0.19 ∼ 0.23 Ω**
Secondary Windings:	**2.5 ∼ 3.7 kΩ**

- ★ If the hand tester reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, replace the coil with one known to be good.
- Check the spark plug lead for visible damage.
- ★ If the spark plug lead is damaged, replace the coil.

Ignition System

Spark Plug Removal/Installation



- Remove the plug cap.
- Remove or install the spark plug using the spark plug wrench [A].

Special Tool - Spark Plug Wrench, Hex 16: 57001–1262

Torque - Spark Plug: 13 N·m (1.3 kgf·m, 9.6 ft·lb)

- installation is the reverse of removal. Noting the following.
  - Fit the plug cap securely.
  - Pull up the spark plug cap lightly to make sure of the installation of the spark plug cap.

Spark Plug Gap

- Refer to Spark Plug Gap in the Periodic Maintenance Chapter.

Spark Plug Cleaning and Inspection

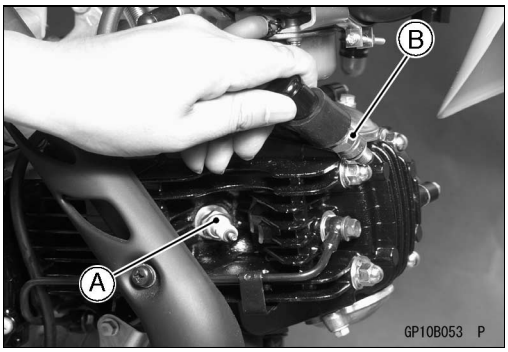
- Refer to Spark Plug Cleaning and Inspection in the Periodic Maintenance Chapter.

Igniter Inspection

CAUTION

When inspecting the igniter observe the following to avoid damage to the igniter.
Do not disconnect the igniter while the engine is running. This may damage the igniter.

Ignition Coil Primary Peak Voltage Check:



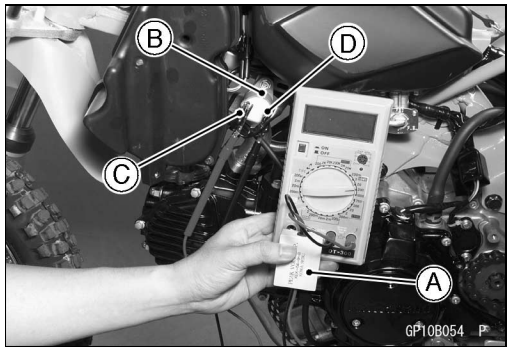
- Remove:
  Radiator Shrouds
  Side Covers
  Seat
- Disconnect the spark plug cap from mounting the spark plug [A].
- Connect the good spark plug [B] to the spark plug cap, then touch the engine with it.

NOTE

- *Measure the voltage with each lead connected correctly. The correct value may not be obtained if disconnected.*
- *Maintain the correct value of compression pressure for the cylinder. (Be sure to measure the voltage with the spark plug install to the cylinder head.)*
- *The correct value may not be obtained if disconnected.*

Ignition System

- Connect the peak voltage adapter [A] between the terminal of primary lead (orange) and ground connection of the unit with the lead of the ignition coil [B] connected.



Recommended Tool:	**Peak Voltage Adapter**	
Type:	**KEK-54-9-B**	
Brand:	**KOWA SEIKI**	
Connection:	**Tester Positive →**	**Black Lead [C]**
	Tester Negative →	**Black/Yellow Lead (Ground) [D]**

- Shift the gear to the neutral position, then free the engine stop switch.
- Crank the engine by kicking the pedal several times to measure the peak voltage of the primary ignition coil.

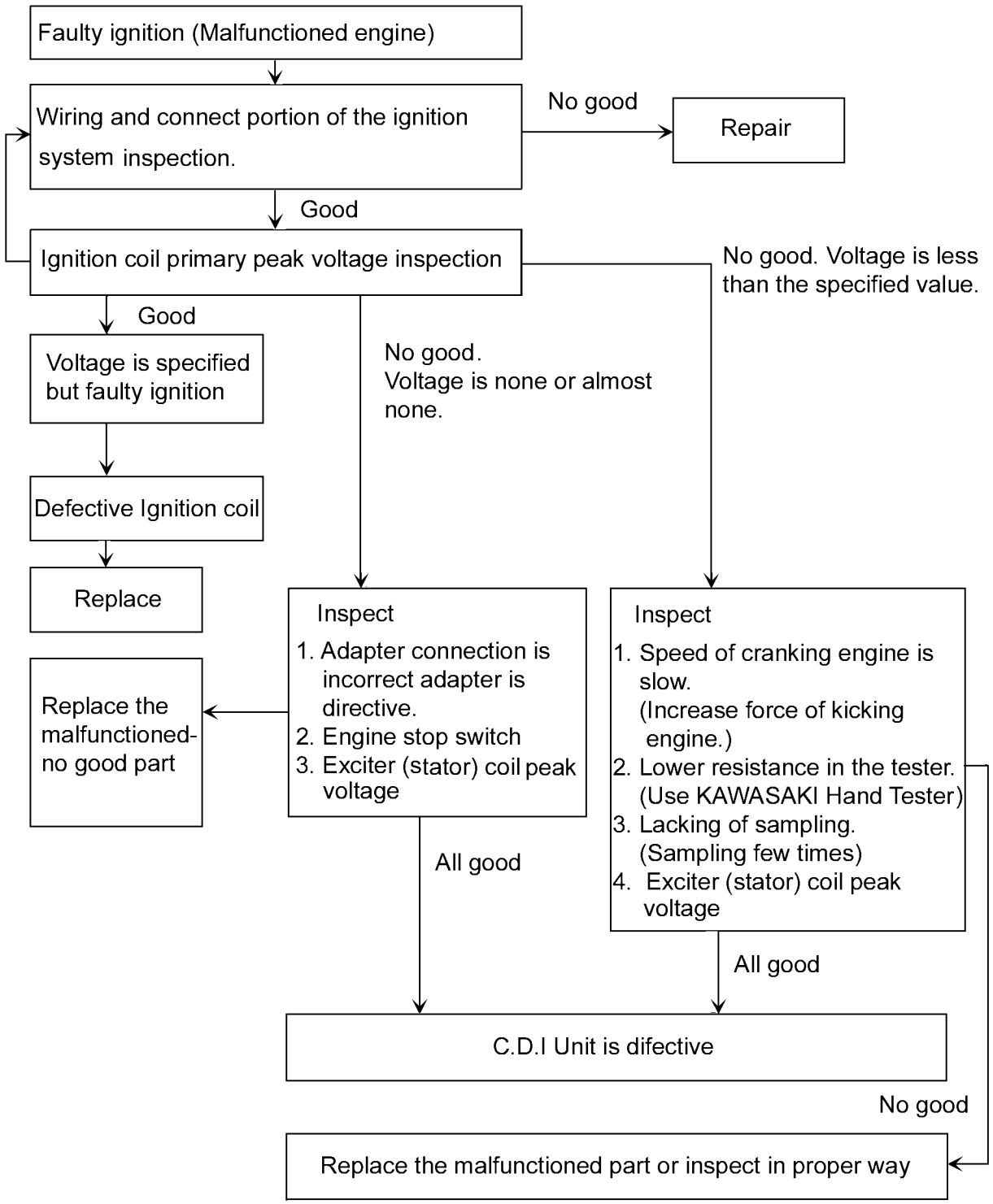
Peak Voltage	**100 V or above**

⚠ WARNING

Do not touch the metal portion of the probe in case of measuring the voltage, or you may receive a serious electric shock.

★If the voltage is less than the specified value, see the next page.

Troubleshooting



Pickup Coil Peak Voltage Check:

● To check the peak voltage, do the following procedures.

○ Disconnect the magneto lead connector.

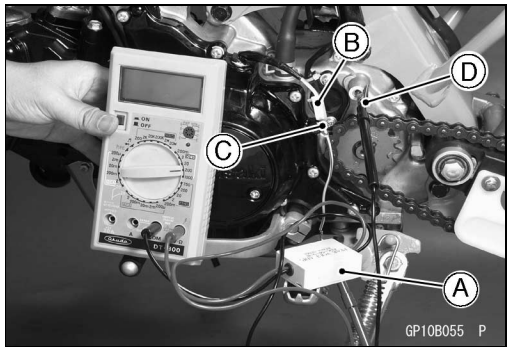
NOTE

○ *Measure the voltage with each lead connected correctly. The correct value may not be obtained if disconnected.*

○ *Maintain the correct value of compression pressure for the cylinder (Be sure to measure the voltage with the spark plug installed to the cylinder head).*

○ *The correct value may not be obtained if disconnected.*

○ Connect the peak voltage adapter [A] of the tester to the terminals of the magneto lead connector [B].



Recommended Tool:	**Peak Voltage Adapter**
Type:	**KEK-54-9-B**
Brand:	**KOWA SEIKI**
Connection:	**Adapter Positive → Blue/Yellow Lead [C]**
	Adapter Negative → Engine Ground [D]

○ Crank the engine by kicking the pedal several times to measure the peak voltage of the pickup coil.

Peak Voltage	**4.6 V or above**

⚠ WARNING

Do not touch the metal portion of the probe in case of measuring the voltage, or you may receive a serious electric shock.

★ If the voltage is less than the specified, check the pickup coil.

Exciter Coil Peak Voltage Check:

● Disconnect the connector of the main harness from the igniter.

● To check the peak voltage, do the following procedures.

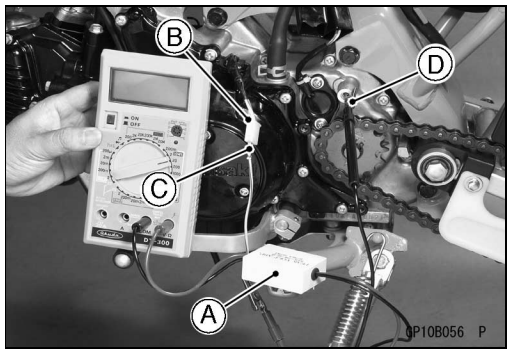
NOTE

○ *Measure the voltage with each lead connected correctly. The correct value may not be obtained if disconnected.*

○ *Maintain the correct value of compression pressure for the cylinder (Be sure to measure the voltage with the spark plug installed to the cylinder head).*

○ *The correct value may not be obtained if disconnected.*

○ Connect the peak voltage adapter [A] of the tester to the terminals of the magneto lead connector [B].



Recommended Tool:	**Peak Voltage Adapter**
Type:	**KEK-54-9-B**
Brand:	**KOWA SEIKI**
Connection:	**Adapter Positive → White Lead [C]**
	Adapter Negative → Engine Ground [D]

○ Crank the engine by kicking the pedal several times to measure the peak voltage of the exciter coil.

Peak Voltage:	**DC 15 V or Above**

★ If the voltage is less than the specified, check the exciter coil.

Switches

Switch Inspection

● Using the hand tester, check to see that only the connections shown in the table have continuity (about zero ohms).

Special Tool - Hand Tester: 57001–1394

★If the switch has an open or short, repair it or replace it with a new one.

Engine Stop Switch Connection

	Y	R
Stop		
Run	O	O

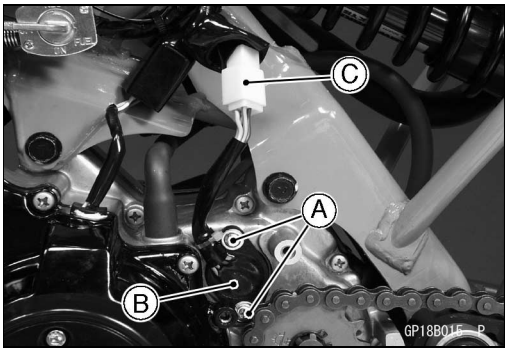
Gear Position Switch Connection

	Ground	LG	G/R
Neutral	O	O	
1st	O		O

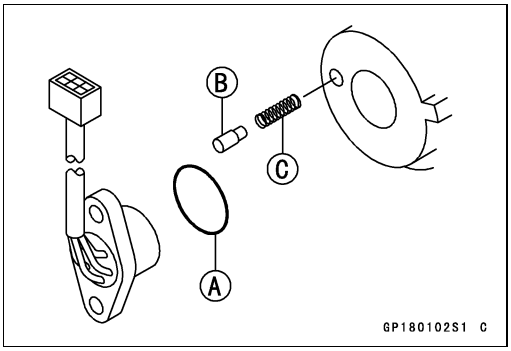
Gear Position Switch Removal

● Remove:
Engine Sprocket Cover (see Final Drive chapter)
Screws [A]
Gear Position Switch [B]

● Disconnect the gear position switch lead connector [C].



● Remove:
O-ring [A]
Gear Position Switch Finger [B]
Spring [C]

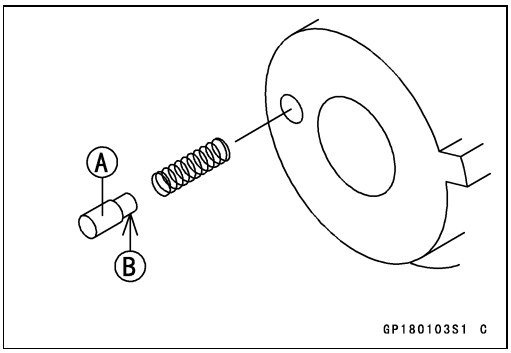


Gear Position Switch Installation

● Insert the spring into the hole in the shift drum.
● Insert the switch finger [A] so that the small diameter [B] toward hole side.
● Apply grease to the O-ring.
● Clean the contact points on the position switch.
● Tighten the gear position switch screw.

Torque - Gear Position Switch Screw: 2.9 N·m (0.3 kgf·m, 26 in·lb)

● Install the other removed parts.



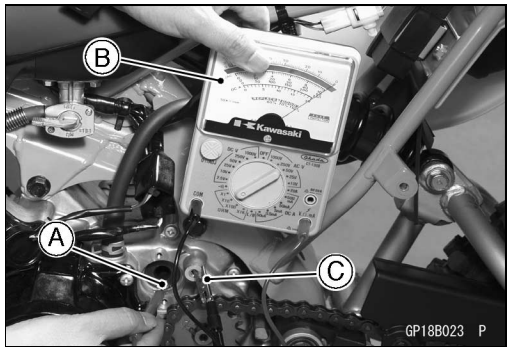
Switches

Gear Position Switch Inspection:

- Remove the gear position switch head and examine the contact points for presence of oxidation, oil or dirt, etc. Clean the contact points, and ensure that the switch finger is working correctly.
- Establish that the switch finger [A] is grounded properly by connecting the hand tester [B] across the engine or frame ground [C] and the switch finger contact points. Check to see that the connetion has continuity (abot zero ohms).

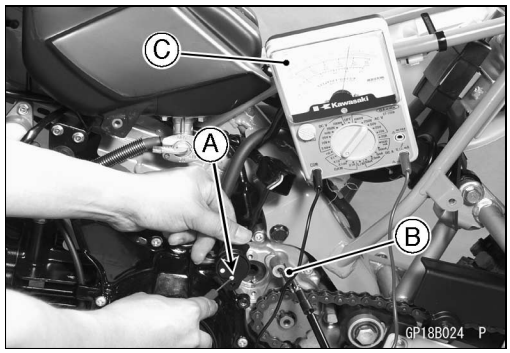
★If the reading is ∞, the switch finger earth is faulty or poor.

Special Tool - Hand Tester: 57001–1394



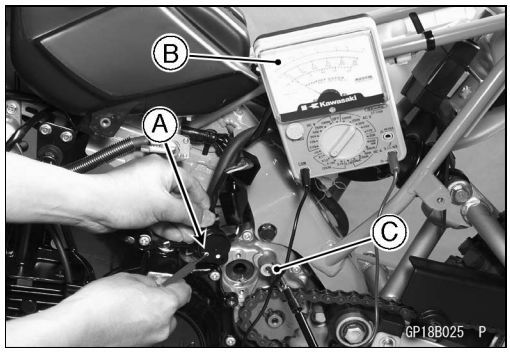
- Establish that the switch head contact point (LG Lead) [A] is grounded properly by connecting the hand tester [B] across the engine or frame ground [C] and the switch head contact point. Check to see that connection has continuity (about 200 ohms).

★If not, check the ground terminal and the igniter ground.



- Establish that the switch head contact point (G/R Lead) [A] is open by connecting the hand tester [B] across the engine or frame ground [C] and the switch head contact point. Check to see that connection has discontinuity (∞).

★If the reading is about zero ohms, the circuit is short.



Troubleshooting

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Troubleshooting Guide

NOTE

○ *This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

Engine Doesn't Start, Starting Difficulty:

Engine won't turn over:
- Valve seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Camshaft seizure
- Transmission gear or crankcase bearing seizure
- Kickstarter return spring broken
- Kick ratchet gear not engaging

No fuel flow:
- No fuel in tank
- Fuel tap turned off
- Tank cap air vent obstructed
- Tank cap clogged
- Fuel line clogged
- Float valve clogged

Engine flooded:
- Fuel level too high
- Float valve worn or stuck open
- Starting technique faulty (When flooded, kick with the throttle fully opened to allow more air to reach the engine.)

No spark, spark weak:
- Engine stop switch turned off
- Spark plug dirty, damaged or maladjusted
- Spark plug cap or high tension wiring damaged
- Spark plug cap shorted or not in good contact
- Ignition coil damaged
- Stator coil damaged
- Igniter broken
- Flywheel magneto damaged
- Engine stop switch shorted
- Wiring shorted or open

Fuel/air mixture incorrect:
- Idle adjusting screw maladjusted
- Pilot jet, or air passage clogged
- Air cleaner clogged, poorly sealed or missing
- Air cleaner duct loose

Compression Low:
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Spark plug loose
- No valve clearance
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn or carbon accumulation on the seating surface)

Poor Running at Low Speed:

Spark weak:
- Spark plug dirty, damaged, or maladjusted
- Spark plug cap or high tension wiring damaged
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- Pickup coil trouble
- Ignition coil damaged
- Igniter broken
- Flywheel magneto damaged

Fuel/air mixture incorrect:
- Idle adjusting screw maladjusted
- Pilot jet, or air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner duct loose
- Choke valve closed
- Float level too high or too low
- Fuel tank air vent obstructed
- Carburetor holder loose

Compression low:
- Cylinder, piston worn
- Piston rings bad (worn, weak, broken or sticking
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- No valve clearance
- Spark plug loose
- Valve spring broken or weak
- Valve not seating properly (Valve bent, worn, or carbon accumulation on the seating surface).
- Crankshaft oil seal deteriorated or damaged

Other:
- Throttle valve doesn't slide smoothly
- Engine oil viscosity too high
- Brake dragging

Poor Running or No Power at High Speed:

Firing incorrect:
- Spark plug dirty, damaged, or maladjusted
- Spark plug cap or high tension wiring damaged
- Spark plug cap shorted or not in good contract
- Spark plug incorrect
- Ignition coil trouble
- Pickup coil trouble
- Stator coil shorted or open
- Igniter trouble

Fuel/air mixture incorrect:
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Jet needle clip in wrong position
- Fuel level too high or too low
- Air jet or air passage clogged
- Air cleaner clogged, poorly sealed or missing
- Air cleaner duct poorly sealed
- Carburetor holder loose
- Fuel to carburetor insufficient
- Water or foreign matter in fuel
- Fuel tank air vent obstructed
- Fuel line clogged
- Fuel tap clogged
- Air cleaner duct loose

Troubleshooting Guide

Compression low:
Cylinder, piston worn
Piston rings bad (worn, weak, broken, or sticking)
Piston ring/land clearance excessive
Cylinder head gasket damaged
Cylinder head not sufficiently tightened down
Cylinder head warped
No Valve clearance
Spark plug loose
Valve not seating properly (Valve bent, worn or carbon accumulation on the seating surface)

Knocking:
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect

Miscellaneous:
Float level too high too or too low
Main jet clogged
Throttle valve does not fully open
Air cleaner clogged
Water or foreign matter in fuel
Brake dragging
Clutch slipping
Overheating
Engine oil level too high
Engine oil viscosity too high
Crankshaft bearing worn or damaged

Overheating:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
Igniter trouble

Fuel/air mixture incorrect:
Main jet clogged or wrong size
Fuel level too low
Carburetor holder loose
Air cleaner clogged
Air cleaner poorly sealed, or missing
Air cleaner duct loose

Compression high:
Carbon built up in combustion chamber

Engine load faulty:
Clutch slipping
Engine oil level too high
Engine oil viscosity too high
Brakes dragging

Lubrication inadequate:
Engine oil level too low
Engine oil poor quality or incorrect

Clutch Operation Faulty:

Clutch slipping:
No clutch release play
Friction plate worn or warped
Steel plate worn or warped
Clutch spring or weak
Clutch release maladjusted
Clutch release mechanism trouble
Clutch hub or housing unevenly worn

Clutch not disengaging properly:
Clutch release play excessive
Clutch plate warped or too rough
Clutch spring tension uneven
Engine oil deteriorated
Engine oil level too high
Engine oil viscosity too high
Clutch housing frozen on drive shaft
Clutch release mechanism trouble

Gear Shifting Faulty:

Doesn't go into gear shift pedal doesn't return:
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Shift return spring weak or broken
Shift pawl spring broken
Shift return spring pin loose
Gear set level binding on pivot bolt
External shift mechanical arm worn
Shift drum damaged

Jumps out of gear:
Shift fork worn
Gear groove worn
Gear dogs, holes, and/or recesses worn
Shift drum groove worn
Shift drum set lever spring weak or broken
Shift fork guide pin worn
Shift pawl spring weak or broken
Drive shaft, output shaft, and/or gear splines worn

Overshifts:
Shift drum set lever spring weak or broken
Shift pawl spring weak or broken

Abnormal Engine Noise:

Knocking:
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Overheating
Spark plug incorrect

Piston slap:
Cylinder/piston clearance excessive
Cylinder, piston worn
Connecting rod bent
Piston pin, piston holes worn

Valve noise:
Valve clearance incorrect
Valve spring broken or weak
Camshaft journals worn

Other noise:
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring worn, broken, or stuck
Piston seizure or damaged
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mounts loose
Crankshaft bearing worn
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Loose magneto flywheel

Abnormal Drive Train Noise:

Clutch noise:
Clutch housing or hub damaged
Clutch housing/friction plate clearance excessive
Clutch housing gear/primary gear backlash excessive

Troubleshooting Guide

Transmission noise:
Crankcase bearing worn
Metal chip jammed in gear theeth
Transmission gears worn or chipped
Engine oil insufficient or too thin
Kick ratchet gear not properly disengaging from kick gear
Kick idle gear worn or chipped
Drive chain noise:
Drive chain adjusted improperly
Chain worn
Rear and/or engine sprocket(s) worn
Chain lubrication insufficient
Rear Wheel misaligned

Abnormal Frame Noise:
Front fork noise:
Oil insufficient or too thin
Spring weak or broken
Rear shock absorber noise:
Shock absorber damaged
Brake noise:
Brake linings over worn or worn unevenly
Drum worn unevenly or scored
Brake spring(s) weak or broken
Foreign matter in hub
Brake not properly adjusted
Other noise:
Bracket, nut, bolt, etc. not properly mounted or tightened

Exhaust Smokes Excessively:
White smoke:
Piston oil ring worn
Cylinder worn
Valve oil seal damaged
Valve guide worn
Engine oil level too high
Black smoke:
Air cleaner clogged
Main jet too large or fallen off
Choke valve closed
Float level too high
Brown smoke:
Main jet too small
Fuel level too low
Air cleaner duct loose
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory:
Handlebar hard to turn:
Steering stem locknut too tight
Steering stem bearing damaged
Race(s) dented or worn
Steering stem lubrication inadequate
Steering stem bent
Tire air pressure too low
Handlebar shakes or excessively vibrates:
Tire worn
Swingarm bushing damaged
Rim warped
Spokes loose
Front, rear axle runout excessive
Wheel bearing worn
Handlebar clamp bolt loose
Steering stem head nut and/or handlebar bracket bolt loose
Handlebar pulls to one side:
Frame bent
Wheel misalignment
Swingarm bent or twisted
Swingarm pivot shaft runout excessive
Steering stem bent
Front fork leg bent
Right/left front fork oil level uneven
Rear shock absorber and/or swingarm bent
Shock absorption unsatisfactory:
(Too hard)
Front fork oil excessive
Front fork oil viscosity too high
Front fork bent
Tire air pressure too high
(Too soft)
Front fork oil viscosity too low
Front fork, rear shock absorber spring weak
Front fork oil leaking
Rear shock absorber oil leaking
Tire air pressure too low

Brake Doesn't Hold:
Drum Brake:
Brake not properly adjusted
Linings overworn or worn unevenly
Drum worn unevenly or scored
Cam, camshaft, shaft hole worn
Oil, grease on lining and drum
Dirt, water between lining and drum
Overheated

MODEL APPLICATION

Year	Model	Beginning Frame No.
2002	KLX110-A1	JKALXSA1□2A000001 or JKALX110AAA000001

□ : This digit in the frame number changes from one machine to another.

Kawasaki
KAWASAKI HEAVY INDUSTRIES, LTD.
Consumer Products & Machinery Company

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